# Visual Impact Assessment

# FINAL

# VISUAL IMPACT ASSESSMENT

# PROPOSED YZERMYN UNDERGROUND COAL MINE

**September 2013**

Document prepared on behalf of:
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| | |
|---|---|
| *APHP* | Association of Professional Heritage Practitioners |
| *BLM* | Bureau of Land Management (United States) |
| *BPEO* | Best Practicable Environmental Option |
| *CALP* | Collaborative for Advanced Landscape Planning |
| *DEA&DP* | Department of Environmental Affairs and Development Planning (South Africa) |
| *DEM* | Digital Elevation Model |
| *DoC* | Degree of Contrast |
| *EIA* | Environmental Impact Assessment |
| *EMP* | Environmental Management Plan |
| *GIS* | Geographic Information System |
| *I&APs* | Interested and Affected Parties |
| *IDP* | Infrastructure Development Plan |
| *IEMA* | Institute of Environmental Management and Assessment (United Kingdom) |
| *IEMP* | Integrated Environmental Management Plan |
| *KOP* | Key Observation Point |
| *MAMSL* | Metres above mean sea level |
| *NELPAG* | New England Light Pollution Advisory Group |
| *PSDF* | Provincial Spatial Development Framework |
| *ROD* | Record of Decision |
| *SDF* | Spatial Development Framework |
| *SEA* | Strategic Environmental Assessment |
| *VAC* | Visual Absorption Capacity |
| *VIA* | Visual Impact Assessment |
| *VRM* | Visual Resource Management |
| *ZVI* | Zone of Visual Influence |

## GLOSSARY

*Best Practicable Environmental Option (BPEO)*
This is the option that provides the most benefit, or causes the least damage, to the environment as a whole, at a cost acceptable to society, in the long, as well as the short, term.

*Cumulative Impact*
The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or

person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

*Impact (visual)*
A description of the effect of an aspect of a development on a specified component of the visual, aesthetic or scenic environment, within a defined time and space.

*Issue (visual)*
Issues are concerns related to the proposed development, generally phrased as questions, taking the form of "what will the impact of some activity be on some element of the visual, aesthetic or scenic environment?"

*Key Observation Points (KOPs)*
KOPs refer to receptors (people affected by the visual influence of a project) located in the most critical locations surrounding the landscape modification, who make consistent use of the views associated with the site where the landscape modifications are proposed. KOPs can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail or river corridor.

*Management Actions*
Actions that enhance the benefits of a proposed development, or avoid, mitigate, restore or compensate for, negative impacts.

*Receptors*
Individuals, groups or communities who would be subject to the visual influence of a particular project.

*Sense of Place*
The unique quality or character of a place, whether natural, rural or urban.

*Scenic Corridor*
A linear geographic area that contains scenic resources, usually, but not necessarily, defined by a route.

*Scoping*
The process of determining the key issues, and the space and time boundaries, to be addressed in an environmental assessment.

*Viewshed*
The outer boundary defining a view catchment area, usually along crests and ridgelines.Similar to a watershed. This reflects the area in which, or the extent to which, the landscape modification is likely to be seen.

*Zone of Visual Influence (ZVI)*
The ZVI is defined as 'the area within which a proposed development may have an influence or effect on visual amenity.'

# 1 INTRODUCTION

VRM Africa was appointed by WSP Environment and Energy (WSP) to undertake a Visual Impact Assessment (VIA) of the proposed Yzermyn Underground Coal Mine on behalf ofAtha Africa Ventures (Pty) Ltd. The proposed mine is to be located near the town of Wakkerstroom in South Africa's Mpumalanga Province as indicated in *Figure 1: Regional localitymap overlaid onto topographic map*. The proposed Yzermyn mine is located within both the Mkhondo and the Pixley Ka Seme local municipalities, which is part of the Gert SibandeDistrict Municipality.

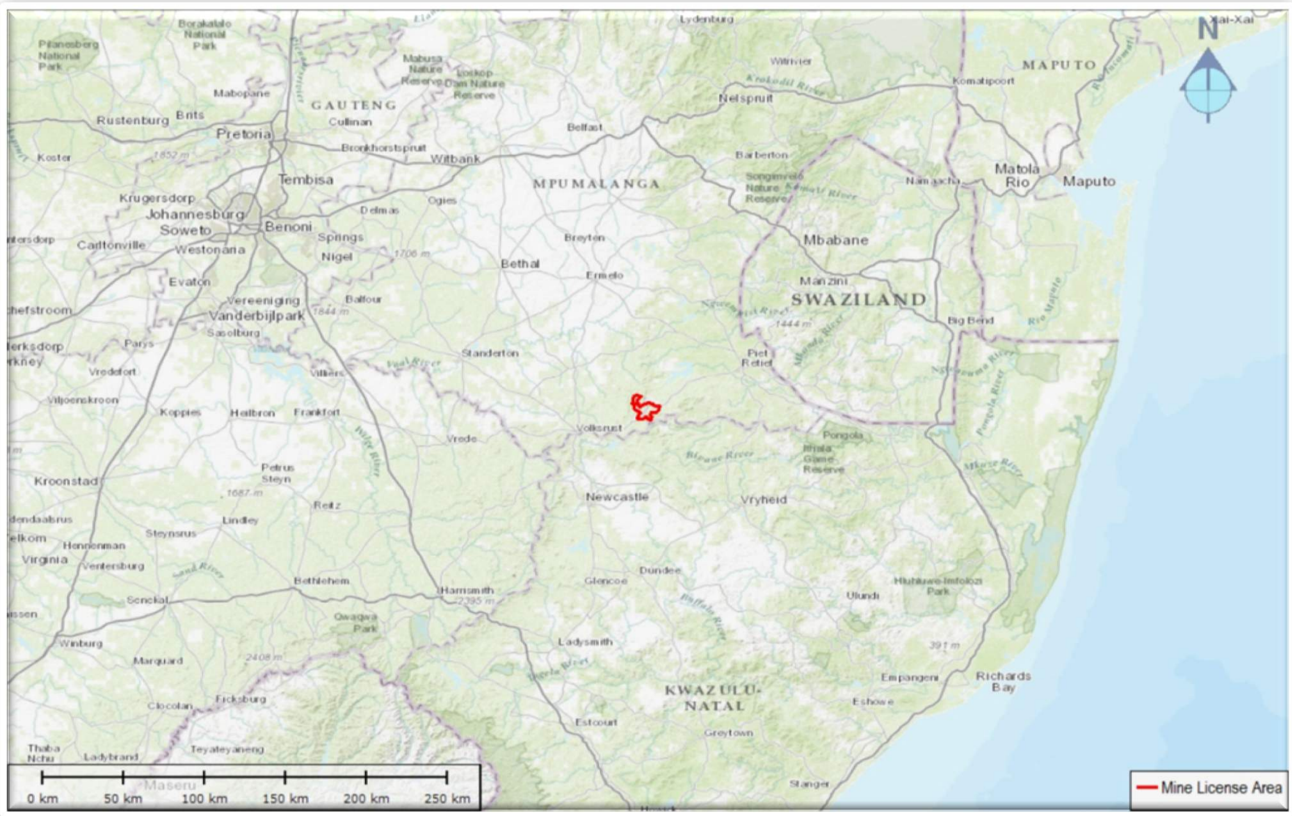



Figure 1: Regional localitymap overlaid onto topographic map

# 2 APPROACH TO STUDY

## 2.1 Terms of Reference

The scope of the study is to cover the entire proposed project area. This includes a site visit of the full site extent, as well as areas where potential impacts may occur beyond the site boundaries.

- All available secondary data relevant to the affected proposed project area to be collated and analysed.

Cumulative effects are to be considered in all impact reports.

- Specific attention is to be given to the following:
    - o Quantify and assess existing scenic resources/visual characteristics on, and around, the proposed site.
    - o Evaluate and classify the landscape in terms of sensitivity to a changing land use.
    - o Determine viewsheds, view corridors and important viewpoints in order to assess the visual impacts of the proposed project.
    - o Determine visual issues, including those identified in the public participation process.
    - o Review the legal framework that may have implications for visual/scenic resources.
    - o Assess the significance of potential visual impacts resulting from the proposed project for the construction, operational and decommissioning phases of the proposed project.
    - o Identify possible mitigation measures to reduce negative visual impacts for inclusion into the proposed project design, including input into the Environmental Management Plan (EMP).

Principles that influence (development) within a receiving environment include the following:

- The need to maintain the overall integrity (or intactness) of the particular landscape or townscape;
- The need to preserve the special character or 'sense of place' of a particular area; and
- The need to minimise visual intrusion or obstruction of views within a particular area.'
  *(Oberholzer, B., 2005)*.

## 2.2 Summary of VIA Methodology

The process that VRM Africa follows when undertaking a VIA is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method. This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using a standard assessment criteria and involves the measurement of contrast in the form, line, texture and colour of the proposed landscape modification brought about by a proposed project, against the same elements found in the existing natural landscape*(BLM. USDI. 2004). See Figure 2: VRM* process diagram.

The first step in the VIA process is determining the existing landscape context. A regional landscape survey is undertaken, which identifies defining landscape features that surround the site of a proposed development, and sets the scene for the VIA process to follow. These features, also referred to as visual issues, are assessed for their scenic quality/worth. A VIA also assesses to what degree people, who make use of these locations (e.g. a nearby holiday resort), would be sensitive to change(s) in their views, brought about by a proposed project (e.g. a mine). *(Assessment undertaken up to this point falls within the ambit of the Field Study.)*

These people are referred to as receptors and are identified early on in the VIA process. Only those sensitive receptors who qualify as Key Observation Points (KOPs) by applying certain criteria, are used to measure the amount of contrast generated by changes caused by proposed project activities, against the existing landscape (i.e. visual impact).

Visibility is sub-divided into 3 distance zones based on relative visibility from travel routes or observation points. Proximity to surrounding receptors is evaluated in terms of these distance buffers: foreground zone is less than 6km, background zone is from 6 to 24km, and seldom seen (beyond 24 km)has no receptors. Viewshed maps are generated that indicate the overall area where the proposed project activities would be visible, and in which distance buffer zone the receptors fall.

The landscape character of the proposed project site is then surveyed to identify areas of similar land use and landscape character. These areas are evaluated in terms of scenic quality (landscape significance) and receptor sensitivity to landscape change (of the proposed site) in order to define the visual objective for the proposed project site. The overall objective is to maintain a landscape's integrity, but this can be achieved at varying levels, called VRM Classes, depending on various factors, including the visual absorption capacity of a site (i.e., how much of the proposed project would be "absorbed" or "disappear", into the landscape). The areas identified on the proposed site are categorised into these Classes by using a matrix developed by BLM Visual Resource Management, which is then represented in a visual sensitivity map.*(Assessment undertaken up to this point falls within the ambit of the Baseline Study).*

The proposed project activities are then finally assessed from the KOPs around the site to see whether the visual objectives (VRM Classes) defined for the site, are met in terms of measuring the potential change to the site's form, line, colour and texture visual elements, as a result of the proposed project (i.e. are the expected changes within acceptable parameters to ensure that the visual character of the landscape is kept intact and, if not, what can be done by the AAP to ensure that it is).Photo montages are generated to represent the expected change in the views, as seen from each KOP and, if class objectives are not met, to also show how proposed mitigation measures could improve the same views.

Using the impact assessment method provided by the environmental consultant, each proposed project activity is assessed in terms of its potential visual impact. This is based on the contrast rating which was undertaken from each of the surrounding receptors on whether the proposed activities meet the recommended visual objectives defined, to protect the landscape character of the area. Recommendations have been included and mitigation measures provided.

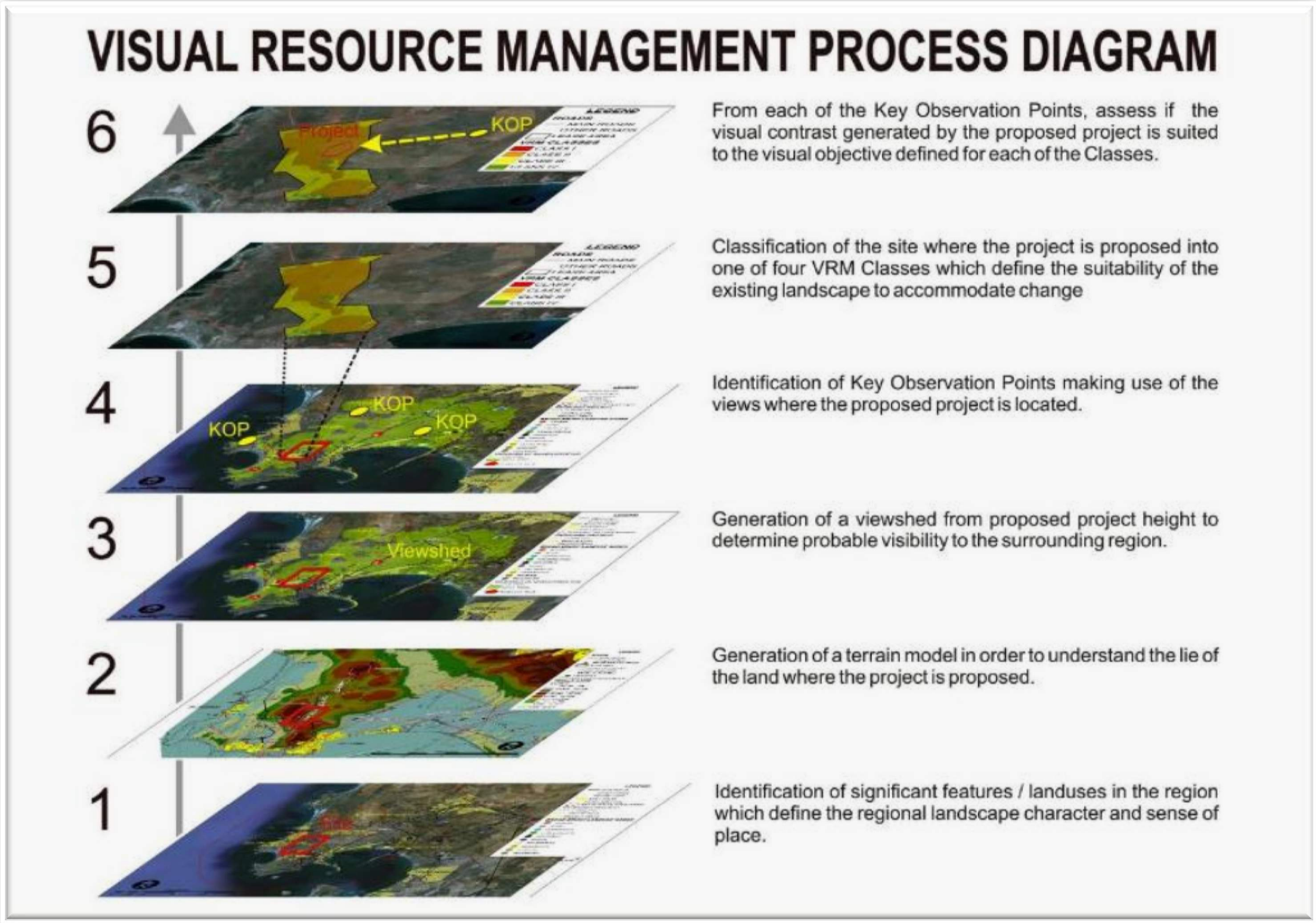



Figure 2: VRM process diagram

## 2.3 Limitations and Assumptions

- Although every effort to maintain accuracy was undertaken, as a result of the Digital Elevation Model (DEM) being generated from satellite imagery and not being a true representation of the earth's surface, the viewshed mapping is approximate and may not represent an exact visibility incidence.
- The use of Google Earth Pro for mapping is licensed for use in this document.
- Some of the mapping in this document was created using Bing Maps (previously *Live Search Maps*, *Windows Live Maps*, *Windows Live Local*, and *MSN Virtual Earth*) and powered by the Bing Maps for Enterprise framework.
- The information for the terrain used in the 3D computer model on which the visibility analysis is based on is:
    - The Advanced Spaceborne Thermal Emission and Reflection (ASTER) Radiometer Data (ASTGTM_S2 3E014 and ASTGTM_S24E014 data set). ASTER GDEM is a product of Japan's Ministry of Economy, Trade and Industry (METI) and National Aeronautics and Space Administration (NASA)in USA.*(ASTER GDEM. METI / NASA. 2011)*
- Determining visual resources is a subjective process where absolute terms are not achievable. Evaluating a landscape's visual quality is complex, as assessment of the visual landscape applies mainly qualitative standards. Therefore, subjectivity cannot be excluded in the assessment procedure*(Lange 1994)*. The project deliverables, including electronic copies of reports, maps, data, shape files and photographs, are based on the author's professional knowledge, as well as available information. This study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of assessment undertaken. VRM Africa reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice, or pertaining to this study.

# 3 LEGISLATIVE CONTEXT

## 3.1 Applicable Laws and Policies

In order to comply with the Visual Resource Management requirements, it is necessary to clarify which planning policies govern the proposed property area to ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area.The proposed landscape modifications must be viewed in the context of the planning policies from the following organisations:

- Gert Sibande District Municipality Spatial Development Framework (SDF) (April 2009)
- To uphold best practice, the 'Guideline for Involving Visual and Aesthetic Specialists in EIA Processes' generated by South Africa's Provincial Government of the Western Cape Department of Environmental Affairs and Development Planning was used as Mpumalanga Province does not have a specific Visual Guideline.

**Gert Sibande District Municipality SDF**

- Chrissiesmeer is the largest freshwater lake in South Africa. This lake, together with a plethora of other smaller lakes and wetlands provide a home to a wide diversity of birds (especially water birds such as Flamingos) and other animal life. Consequently, the Wakkerstroom and Chrissiesmeer areas are now considered as two of Africa's key ornithological sites.
- The Heyshope Dam Water and Eco-Tourism Node is situated between Wakkerstroom and Piet Retief in the Mkhondo Local Municipality. The Tourism Growth Strategy envisions the development of a family eco-adventure resort.
- Tourism is to be promoted in a way that enhances and protects the natural environment.
- Areas of mineral potential are to be exploited in a sustainable manner.
- The major mining precincts coincide with high-potential extensive agricultural land and some of the ecological corridors identified by the Mpumalanga Biodiversity Conservation Plan. It is thus essential that mining activity (which consists mostly of open cast mining) be concentrated within already affected areas, and be managed in such a way that the original agricultural/tourism value of the land is restored once mining activities close down. This would require that a proper Environmental Management Plan for mining activities in the District be put in place, and that it be properly implemented and continuously monitored. This is of critical importance within the proposed tourism and conservation belt, as some of the mining activities are located relatively close to the sensitive environments around Chrissiesmeer. (*Gert Sibande District Municipality SDF. 2009)*

**DEA&DP Guideline for involving Visual and Aesthetic Specialists in EIA Processes**

The Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for involving visual and aesthetic specialists in EIA processes states that the Best Practicable Environmental Option (BPEO) should address the following:

- Ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area. The BPEO must also ensure that development must be located to prevent structures from being a visual intrusion (i.e. to retain open views and vistas).
- "Long term protection of important scenic resources and heritage sites;
- Minimisation of visual intrusion in scenic areas;
- Retention of wilderness or special areas intact as far as possible;
- Responsiveness to the area's uniqueness, or sense of place. " *(Oberholzer, B., 2005)*

### 3.2 Relevant Standards to Comply With

The International Finance Corporation (IFC) prescribes eight performance standards (PS) on environmental and social sustainability. The first is to identify and evaluate the environmental and social risks and impacts of a project, as well as to avoid, minimise or compensate for any such impacts. Under PS 6, ecosystem services are organized into four categories, with visual/aesthetic benefits falling into the category of cultural services, which are the non-material benefits people obtain from ecosystems*(IFC. 2012).*This emotional enrichment that people experience and obtain from cultural ecosystems services is described by The Millennium Ecosystem Assessment, 2005, Ecosystems and Human Well-being: Synthesis report as follows: "Cultural ecosystems services: the non-material benefits that people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences."*(Millennium Ecosystem Assessment. 2005).*

The above includes the following, amongst others:

- Inspiration: Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising;
- Aesthetic values: Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, scenic drives, and the selection of housing locations;
- Sense of place: Many people value the "sense of place" that is associated with recognised features of their environment, including aspects of the ecosystem;
- Cultural heritage values: Many societies place high value on the maintenance of either historically important landscapes ("cultural landscapes") or culturally significant species; and
- Recreation and ecotourism: People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area.

The visual experience is not limited to the visual senses, but is a multisensory emotional involvement experienced by people when they perceive a specific scene, landmark, landscape, etc. The assessment subject of VIA is in itself a result of human perception.

# 4 PROJECT DESCRIPTION

The objective of this section is to describe the character of the proposed project activities and define the extent to which it will be visible to the surrounding areas. The proposed project site and layout plans can be seen in Figures 3 – 4 on the following pages.

## 4.1 Proposed Activities

Twelve proposed project activities were assessed in this VIA study.

1. Proposed mine plant and stockpiles:
    a. *Plant;*
    b. *Primary stockpile and conveyor;*
    c. *Secondary stockpile and conveyor;*
    d. *Discard bin and conveyor; and*
    e. *Plant water dam.*
2. Proposed workshops:
    a. *Workshops;*
    b. *Ablution Blocks;*
    c. *Oil and chemical stores; and*
    d. *Wash bay.*
3. Proposed office block and parking:
    a. *Office block;*
    b. *Office and bus parking; and*
    c. *Sewerage plant.*
4. Proposed isolated smaller buildings:
    a. *Gatehouse;*
    b. *Weighbridge and office; and*
    c. *Magazine;*
5. Pollution Control Dam;
6. Proposed tunnel and conveyors:
    a. *Stockpile conveyors;*
    b. *Transfer tower; and*
    c. *ROM tunnel and stockpile.*
7. Proposed access roads;
    a. *8m for heavy vehicles*
    b. *7m for light vehicles.*
8. Proposed transport routes;
9. Dust;
10. Lights at night;
11. Piet Retief siding site; and
12. Panbult siding site.

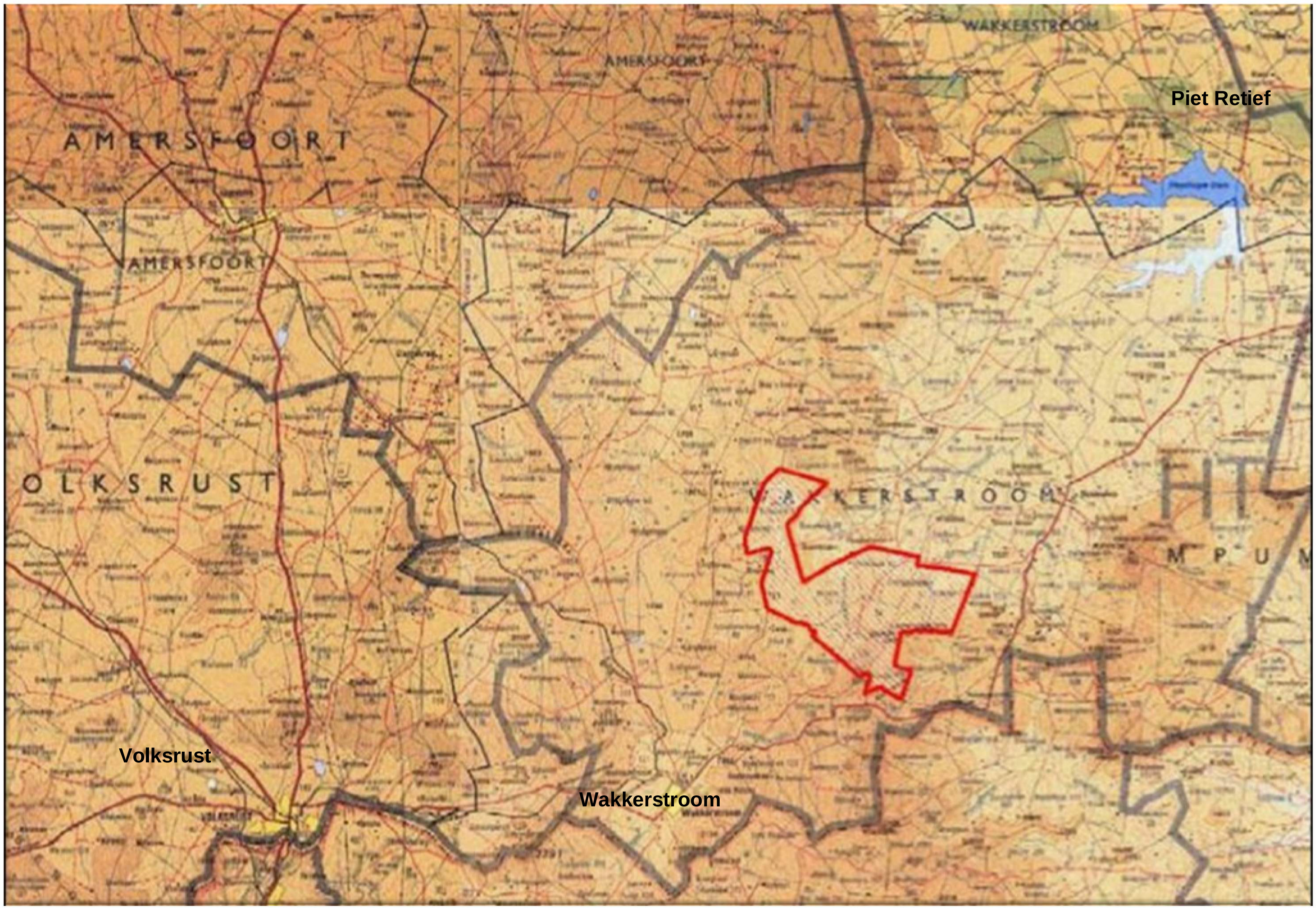



Figure 3: Proposed Mine License Area Map

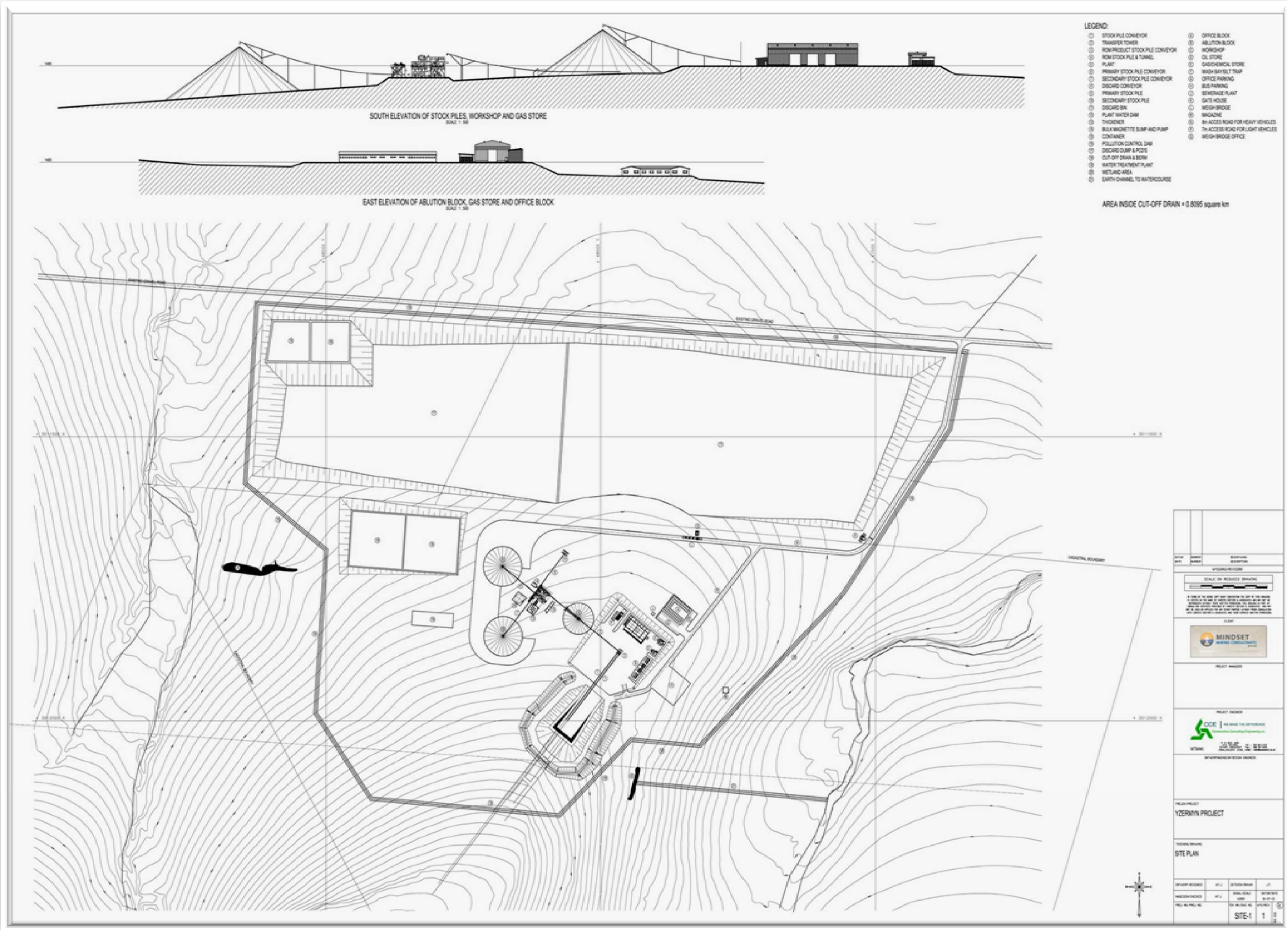



Figure 4: Proposedminelayout map

## 4.2 Mining Target Area

The total Project Area consists of 12 farms, covering 8360 hectare (ha), of which the Target Area has been explored to a classification level of Indicated. The remainder of the Project Area requires considerable further exploration. The farms identified for the Project area is reflected in the table below.

| FARM | PORTION | REG DIV | PROVINCE | EXTENT (Ha) | PROJECT |
|---|---|---|---|---|---|
| BLOEMHOF 92 | THE FARM | HT | MPUMALANGA | 329.0882 | YZERMYN |
| GOEDGEVONDEN 95 | THE FARM | HT | MPUMALANGA | 739.4455 | YZERMYN |
| KROMHOEK 93 | THE FARM | HT | MPUMALANGA | 1184.728 | YZERMYN |
| NAUWGEVONDEN 110 | PORTION 1 | HT | MPUMALANGA | 428.266 | YZERMYN |
| PAARDEKOP 109 | THE FARM | HT | MPUMALANGA | 400.0447 | YZERMYN |
| UITZICHT 108 | THE FARM | HT | MPUMALANGA | 691.3141 | YZERMYN |
| VAN DER WALTSPOORT 81 | PORTION 2 | HT | MPUMALANGA | 1064.4525 | YZERMYN |
| VAN DER WALTSPOORT 81 | REMAIN EXTENT | HT | MPUMALANGA | 1022.9803 | YZERMYN |
| VIRGINIA 91 | THE FARM | HT | MPUMALANGA | 925.4029 | YZERMYN |
| YZERMYN 96 | PORTION 1 | HT | MPUMALANGA | 193.8289 | YZERMYN |
| YZERMYN 96 | REMAIN EXTENT | HT | MPUMALANGA | 826.1608 | YZERMYN |
| ZOETFONTEIN 94 | THE FARM | HT | MPUMALANGA | 553.8079 | YZERMYN |

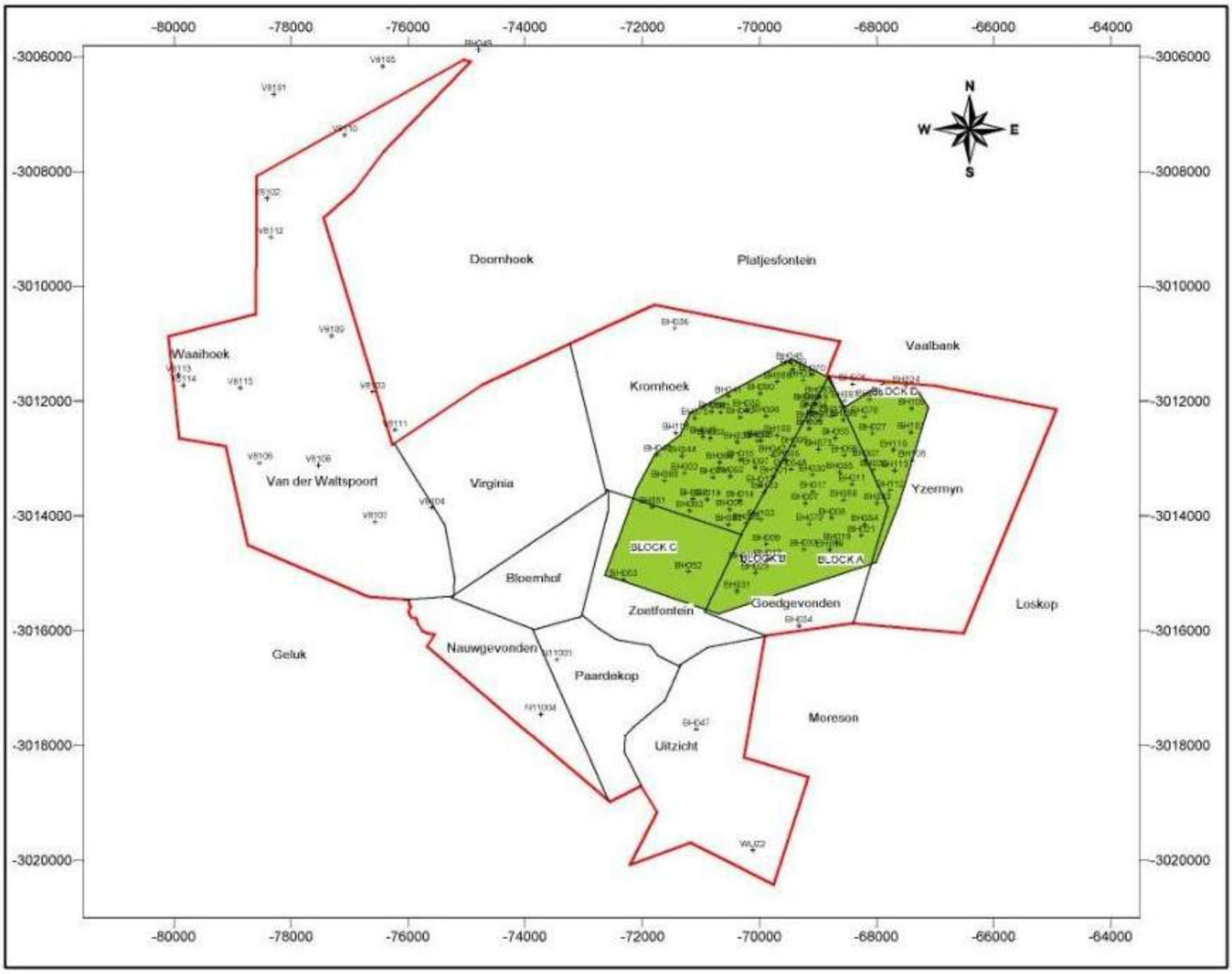
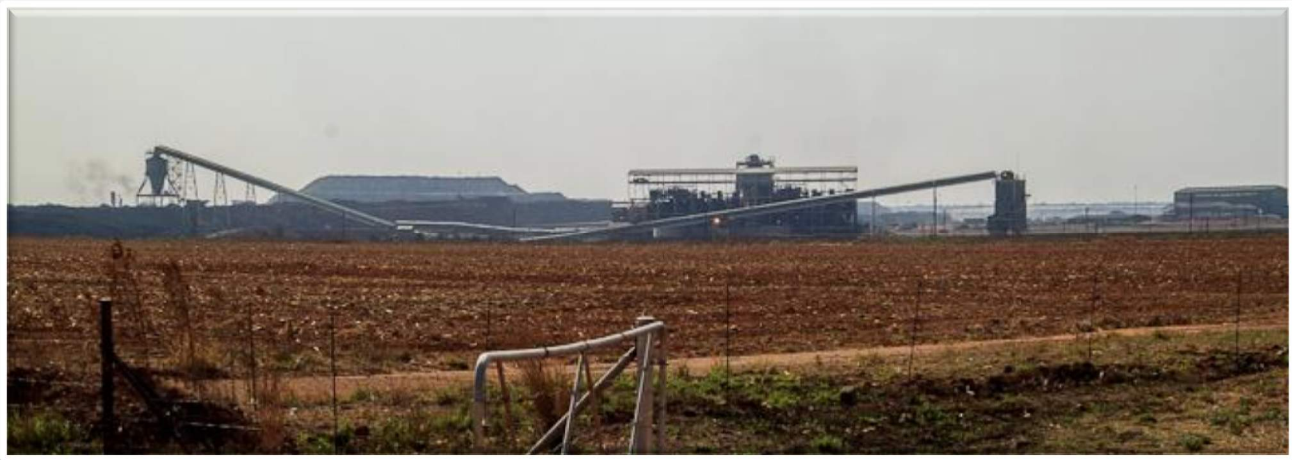



Figure 5:Alfred Seam Target Area (green) within prospecting rights boundary area (red line)

The first round of exploration was concentrated on Yzermyn 96, Goedgevonden 95, Zoedfontien-94 and Kromhoek 93 and has a footprint area of around 2500 ha. The area for surface infrastructure (Adit Box-Cut, Wash Plant, Discard dumps, PCD, Office infrastructure) and access roads is 86 ha. The LOM plan indicated that all production sections will be active right up to end of life of mine and there is no definitive time when actual closure will commence. Further exploration will be targeted at the remainder of the Prospecting Rights Area. *(Atha Group. 2013)*

### 4.3 Proposed mine plant and stockpiles



Photograph ofAnglo Coal Ke Nako Shaft underground mining operation
*(Source: 20121006-3068 www franzfuls files wordpress com)*

Photograph of coal mine stockpiles and infrastructure

*(Source:www.magogminingcc.wozaonline.co.za)*

Photograph example of stockpile infrastructure, Kiepersol Colliery, Piet Retief
*(Source: www cdn mg co za)*

Figure 6: Examples of mine plant and stockpiles

The mining infrastructure of the proposed underground coal mine includes the plant, primary and secondary stockpiles, as well as the plant water dam and discard bins. The processing plant has an approximate height of 10 m and will be a single stage wash plant or a two-stage wash plant. The stockpiles are approximately 20 m in height and conveyors deliver the ROM material from the underground operations to a 12,000mt open stockpile, ahead of the coal handling and preparation plant. *(Atha Group. 2013)*

### 4.4 Proposed workshops and storage facilities

Figure 7: Photograph of existing SA Calcium Carbide Mine site workshop and waste dump

These structures would include the workshops, storage buildings and ablution structures. The workshops have an approximate height of 20 m while the other structures are approximately 5 m in height. The mine offices, workshops and change houses will therefore be in the form of portable containers specially adapted for these purposes. Placed on concrete plinths they will be easily removed at the end of the life of the mine. A total of 576 people will be required to operate the mine when in full production. *(Atha Group. 2013)*

### 4.5 Proposed additional mining infrastructure

Figure 8: Photograph of additional mining infrastructure, Rocanville mine site, Canada
*(Source: www.nscminerals.com)*

Mining infrastructure would include isolated smaller buildings of 3 m – 5 m. Pollution control dams (2 m) will be established on the mine site, where all dirty water will be stored for re-use. *(Atha Group. 2013)*

### 4.6 Proposed tunnel and conveyors

Photograph example of conveyor, Savmore Colliery, Piet Retief

*(Source: www hatch co za)*

Photograph example of stockpile infrastructure, Kiepersol Colliery, Piet Retief

*(Source: www cdn mg co za)*

Figure 9: Examples of tunnels and conveyors

The tunnels and conveyors transporting the coal from the plant to the stockpiles would include a stockpile conveyor (20 m), transfer tower (5 m) and tunnels which would have an approximate height of 15 m.

### 4.7 Proposed Trucks, Access and Transport Routes


Figure 10: Photograph of coal transport trucks at Piet Retief siding

The project would require the new roads, and upgrading of existing road infrastructure. Currently the only road giving access to the Target Area is a gravel farm road. This road is approximately 12km in length and will require upgrading in order to be able to accommodate vehicles to-and-from the mine. The company recommends that the road to Piet Retief be used for transporting coal to the railway siding. All products from the mine will transported by means of 30-tonne road coal haul trucks from the mine site to the Piet Retief Rail Siding for dispatch. *(Atha Group. 2013)*

## 4.8 Dust


Figure 11: Photograph of dust caused by transport trucks on access road
*(Source: 20121006-3188 www.franzfuls.wordpress.com)*

Dust is created by the large trucks transporting the coal from the mine to the sidings. Water will need to be applied at all coal transfer points to allay dust as well as on travelling roads.

## 4.9 Lights at Night

Figure 12: Photograph of Mooiplaats coal project in the Mpumalanga province of South Africa

The proposed mine capacity is designed to allow the washplant to operate 22 hours per day, seven days per week, with an eight hour planned maintenance shutdown once a week. *(Atha Group. 2013)*

### 4.10 Coal Siding Site Alternatives

Figure 13: Photograph of existing Jindal siding site

Two alternatives for the stockpiling and loading of the coal of trains were identified, Piet Retief and Panbult coal sidings.

- Piet Retief Site: The area is located in close proximity to the town of Piet Retief, which is a timber and industrial node. It is the existing Jindal railway siding where existing coal stockpiles and trucks are located.
- Panbult Site: The Panbult siding is an existing well established railway siding located on the N4. The area also includes industrial nodes and a grain silo, as well as some timber industry infrastructure located in close proximity to the proposed area.

### 4.11 No Go Alternative

The No go alternative proposes that status quo remains the same and proposed development does not go ahead. The No Go alternative is used to compare the proposed activities during the Impact Assessment phase of this process. The current landuse is agricultural beef farming and this activity would continue to take place should the proposed mine not take place.

# 5 LANDSCAPE CONTEXT

Landscape character is defined by the U.K. Institute of Environmental Management and Assessment (IEMA) as the 'distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, land form, soils, vegetation, land use and human settlement'. It creates the specific sense of place or essential character and 'spirit of the place' *(Spon Press, 2002).*The first step in the VIA process is determining the existing landscape context of the region and of the site(s) where the project is proposed.

Mpumalanga lies in eastern South Africa, north of Kwazulu-Natal and bordering Swaziland and Mozambique. The province of Mpumalanga can be divided into four primary landscapes which formed as a result of the topography, underlying geology, soils, elevation, rainfall and climate. The proposed mine site falls within Southern Mpumalanga which is a site of rich floral and faunal endemism, an Important Bird Area (IBA) and the source of major river systems, namely the Usutu and Pongola Rivers *(www.wwf.org.za).*

The Gert Sibande District is comprised mainly of Highveld grasslands, and drops into the Lowveld regions towards the south and east. The area has a strong mineral potential, as well as tourism and biodiversity attributes. The municipality plays host to a number of large economic activities, including mining, agriculture and tourism. The key economic sectors of the district are: Manufacturing (SASOL); Mining (coal, gold, quarry); Energy Generation and Supply; Agriculture (crops and livestock); and Services. *(WSP Environmental (Pty) Ltd. 2013)*

The site is situated between Wakkerstroom and Piet Retief within the eMkhondo Local Municipality which is part of the Gert SibandeDistrict Municipality in Mpumalanga Province.The Project Mine Area is situated in the Dirkiesdorp district of the Mpumalanga province of South Africa. The Area lies approximately 58 kilometres (km) South West of Piet Retief. The small rural village of Dirkiesdorp is approximately 15 km from the proposed site.

The Piet Retief siding can be accessed primarily by gravel road from the town of Dirkiesdorp, which is currently being utilised by Jindal Mining SA. This siding is not fully utilized at present and The Client is recommended to utilise the siding as it is served with a tarred provincial road from Dirkiesdorp to Piet Retief

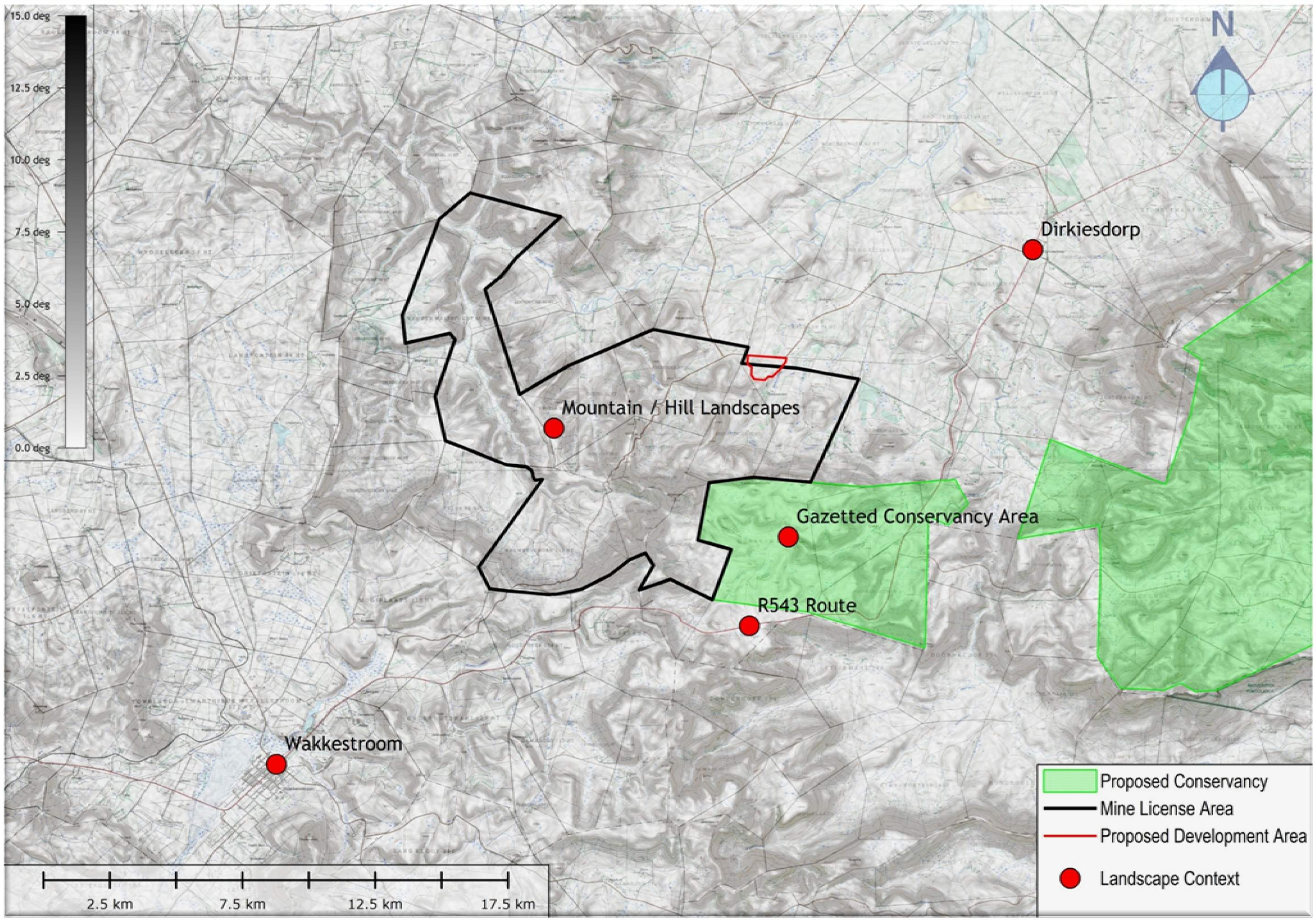



Figure 14: Local Landscape Context Feature Location Map

## 5.1 Wakkerstroom Tourism Context

Wakkerstroom is a small rural centre, located on the R543, which performs a service function to the agricultural and tourism sectors in the immediate area. The town comprises approximately 344 households. Adjacent to town of Wakkerstroom is the eSizameleni Township, which is comprised of approximately 1642 households *(Pixley Ka Seme IDP, 2011).* This settlement is characterised by high-density, low to middle income housing (predominantly RDP housing), limited formal and informal businesses (retail), and limited social services *(WSP Environmental (Pty) Ltd. 2013).*

The main industry in Wakkerstroom is focused around agriculture and tourism and is situated in a beautiful valley, 27 km from the town of Volksrust, and lies at an altitude of 1760m. Newcastle and Piet Retief (eMkhondo) are the closest large towns, both lying 80km away. The Wakkerstroom district is a major farming area, with the main crops being maize. Cattle and sheep are the main livestock farmed in the area *(www.wakkerstroomtourism.co.za)*. Wakkerstroom is one of the key birding sites on the Mpumalanga Birding Route due to the significance of the Wakkerstroom river biodiversity area, as well as the importance of the area as a Birding SA heritage site *(www.birdingroutes.co.za).*

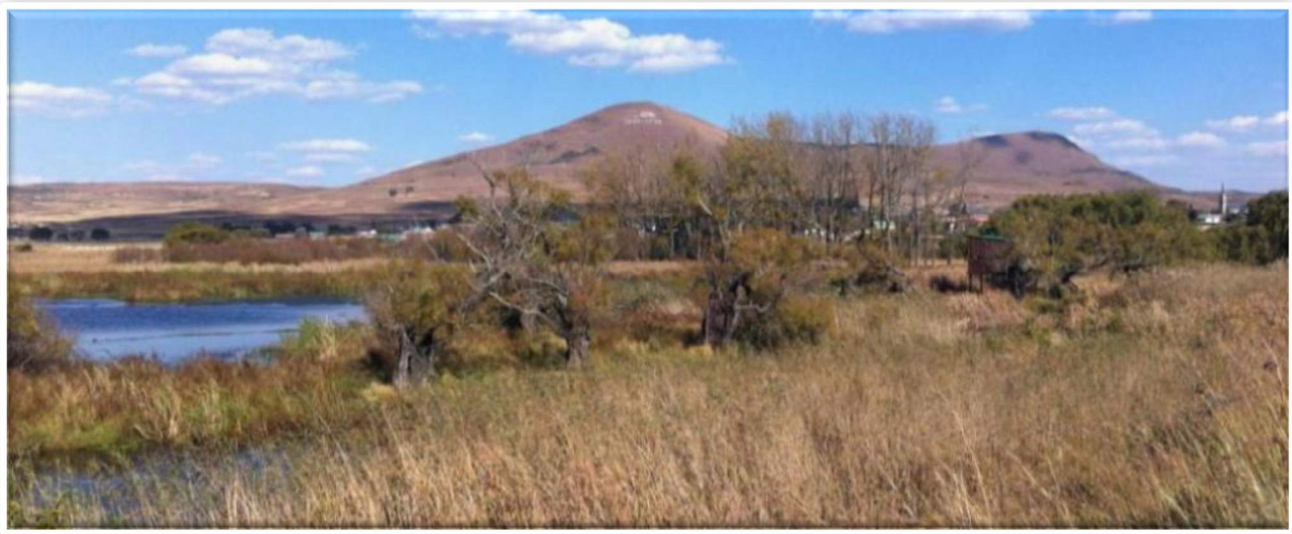


Figure 15: View of vlei and open pans adjacent to Wakkerstroom

## 5.2 Existing Piet Retief Context

Piet Retief is situated in the extreme South East corner of the Mpumalanga Province on the N2, roughly 100km from Vryheid. It is a medium-sized town, with a forestry related industrial context, forestry being the dominant surrounding land use. It is ideally situated halfway between the Gauteng metropolis (Johannesburg and Pretoria) and the Natal coast (Richards Bay and Durban). It forms part of the Gert Sibande District Municipality and is the main link of both industrial and commercial transport from Gauteng to the import/export harbour at Richards Bay. *(www. localgovernment. co. za).* Piet Retief plays a significant role in the local and regional context in terms of service provision, including a logistics and transport hub (road and rail), and the seat of local branches of national businesses (specifically forestry and agriculture related). eThandakukhanya, the township associated with Piet Retief, is located on the outskirts of the town, on south western side. *(WSP Environmental (Pty) Ltd. 2013)*

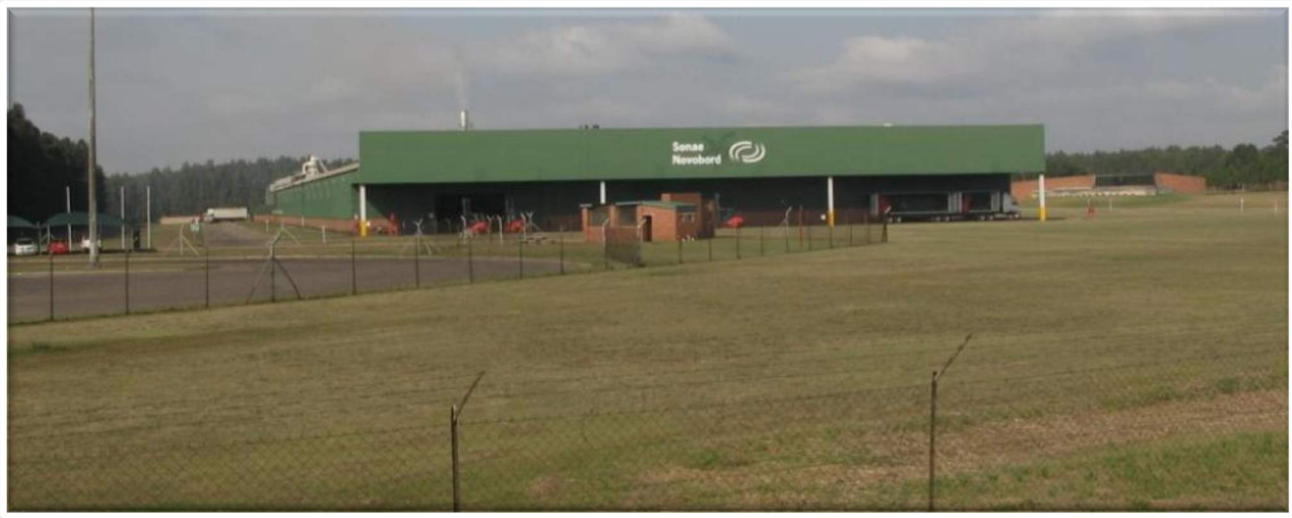


Figure 16: Photograph of surrounding industrial sense of place

## 5.3 Existing surrounding context

Within the 20 km area of direct influence are the Yzermyn Farm Community (0 – 2 km), Dirkiesdorp, KwaNgema, Wakkerstroom, Piet Retief and Volksrust. The Yzermyn Farm Community isapproximately eight scattered homesteads, occupied by Black low-income families as well as several other similar homesteads scattered on the farms outside of the target area, along access roads. Dirkiesdorp is a sprawling formal rural centrewith an agricultural, rural sense of place. There are no municipal services except electricity. The Sinethemba Agricultural Secondary School, set up by the Themba Trust, is situated in the area. The extended Dirkiesdorp area is comprised predominantly of large family (traditional Zulu) homesteads, with some individual houses. The KwaNgema settlement is a large, sprawling community, without a key central point. It is comprised predominantly of scattered traditional homesteads. KwaNgema, however, appears to be more established, with larger, cohesive homesteads, which include visible small-holdings for subsistence crop farming. This community appears to have a stronger focus on agriculture activities, specifically crop and cattle rearing.*(WSP Environmental (Pty) Ltd. 2013)* Volksrust and the associated township, Vukuzakhe, form the largest urbanised area within the Pixley Ka Seme Local Municipality. Volksrust is a medium-sized town, with 2819 households, and 3709 households in Vukuzakhe *(Pixley Ka Seme IDP, 2011).*

Figure 17: Photograph of Dirkiesdorp
*(Source: www.panoramio.com/chrjp)*

## 5.4 Existing Gazetted conservation Area

As indicated in the map on the following page, due to the significant biodiversity of the region, a large number of farms to the east of the site, adjacent to the mine license area, have been gazetted as conservation areas. 23 600 hectares of privately-owned farmland extending from Wakkerstroom to Luneberg in the high altitude grasslands of southern Mpumalanga is a Protected Environment. Called the KwaMandlangampisi Protected Environment it is a critical water catchment area for South Africa that includes the headwaters of the Pongola River and the Assegaai River, which feeds the Heyshope Dam and provides clean water for national power generation. Ranging from 1400 metres to 2000+ metres above sea level, it spans threatened high altitude grasslands, wetlands and indigenous mist belt forest, and is home to threatened and endemic plant, bird and animal species, including the Oribi and South Africa's three Crane species (Wattled, Grey Crowned and Blue)*(www.wwf.org.za).* "The need to carefully manage our water and water production areas in South Africa is self-evident, especially as coal-prospecting rights were granted on farms in the most water sensitive areas between Wakkerstroom and Luneburg, which include the headwaters of several river catchments," *(WWF. 2010).*

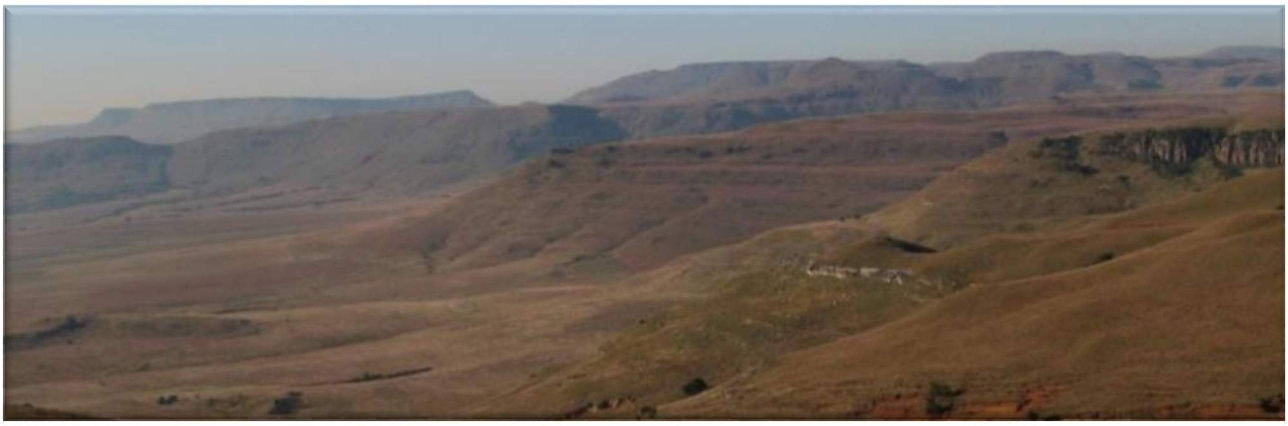


Figure 18: View of Gazetted conservation areas

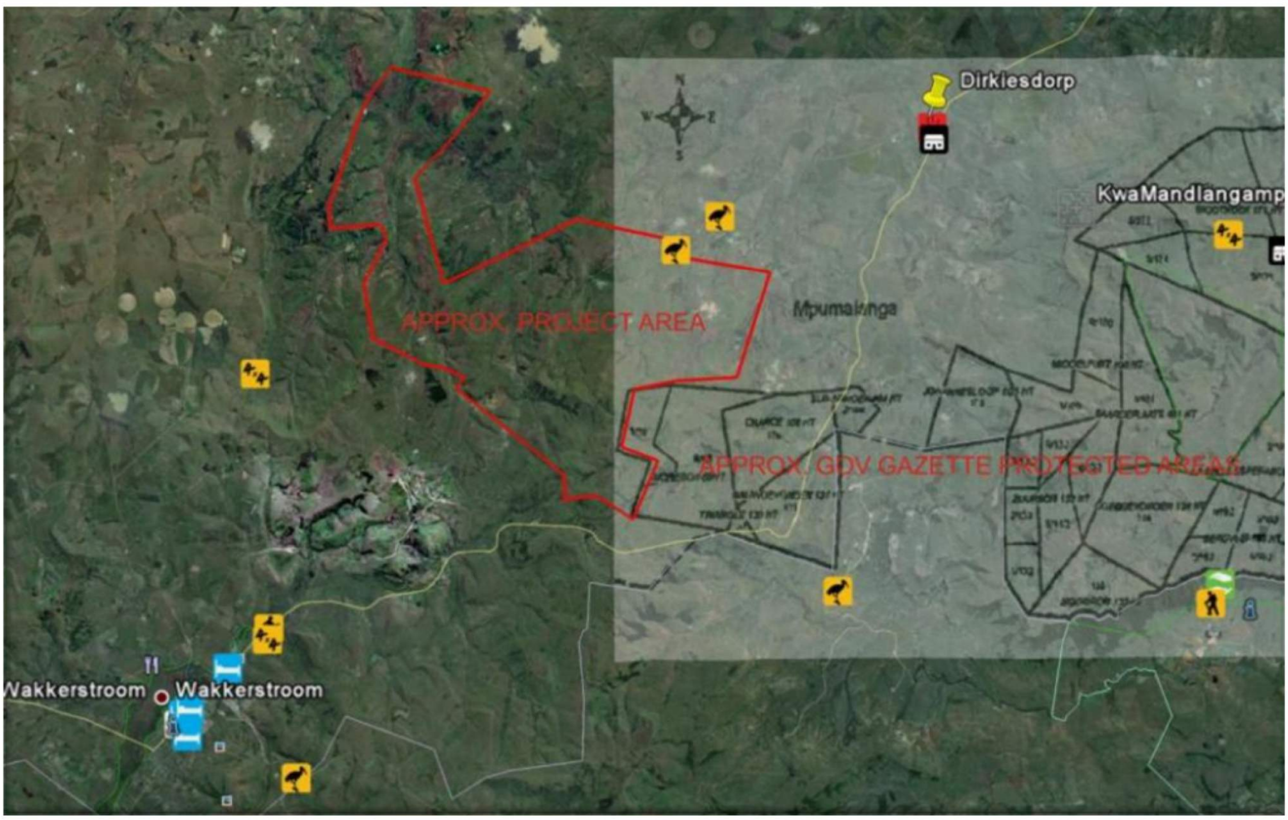



Figure 19: Approx. location of gazetted conservation areas in relation to mine licence area

## 5.5 Topography

As can be seen from *Figure 21: Regional terrain model*, the terrain in the vicinity of the mine is mountainous, with elevations ranging from 1200m to 2142m. The mountains form part of the Great Escarpment which runs from the Mozambique border in the north-east all the way around the southernmost boundary of South Africa to the Roggeveld near the Namibian border in the south-west, separating the coast from the high inland plateau. The mountain escarpment is also a boundary feature between Mpumalanga province in the north and Kwazulu-Natal in the south. The proposed site is located in the northern foothills of the mountain range, with the tourist town of Wakkerstroom located on the opposite side of the mountain range, to the south. Due to the location of the site on the foothills, the site is prominent and would be seen from within a large area towards the northern low-lying lands.

Figure 20: View of mountainous area surrounding Wakkerstroom

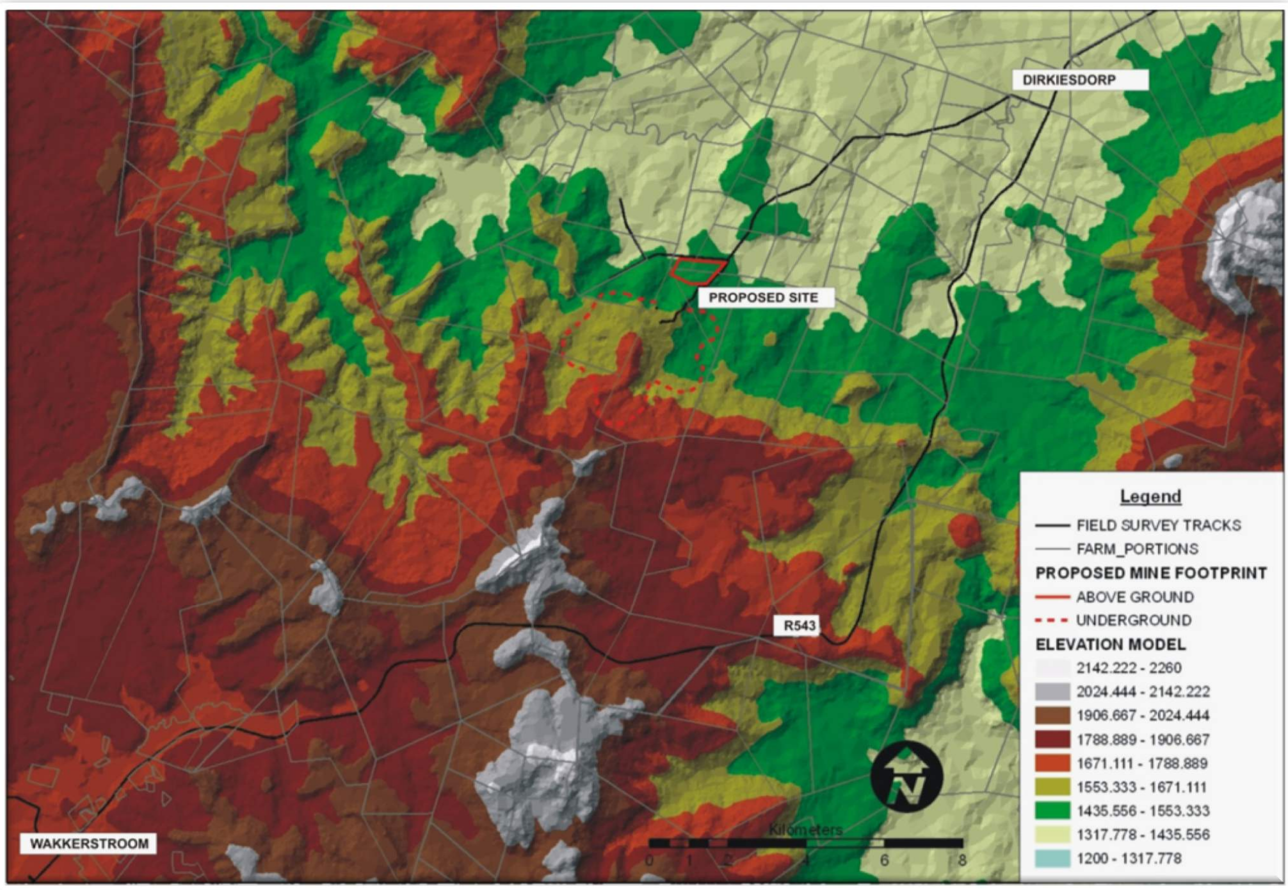



Figure 21: Regional terrain model

## 5.6 Vegetation

Within the study region, as indicated in the Yzermyn Baseline and Impact Vegetation Assessment, the vegetation is representative of the Grassland Biome and falls within the NPAs South Eastern Escarpment as well as the proposed Enkangala / Grassland Biosphere Reserve. The proposed lease and undermining area span three regional vegetation types within this biome (Section A). These vegetation types are the (i) Paulpietersburg Moist Grassland, (ii) Wakkerstroom Montane Grassland and (iii) Northern Afrotemperate Forest (Mucina & Rutherford, 2006). These vegetation types, like many other units within the Grassland Biome, are highly diverse and under threat through anthropogenic influences.

The wooded thicket areas within 1 km of the proposed surface infrastructure zone include natural state and restricted habitat, some alien invasives along the systems, particularly in the eastern component. Limited erosion evident, mainly at cattle crossings and it is rated as a Very High area of conservation importance. The Hydromorphic grasslands in this area are in a relatively natural state with heavy alien invasion of the eastern section with moderate diversity and has a rating of High to Very High for areas of conservation importance. The upper slopes and plateau grasslands have a medium to Medium-High conservation importance rating.*(Natural Scientific Services. 2013)*

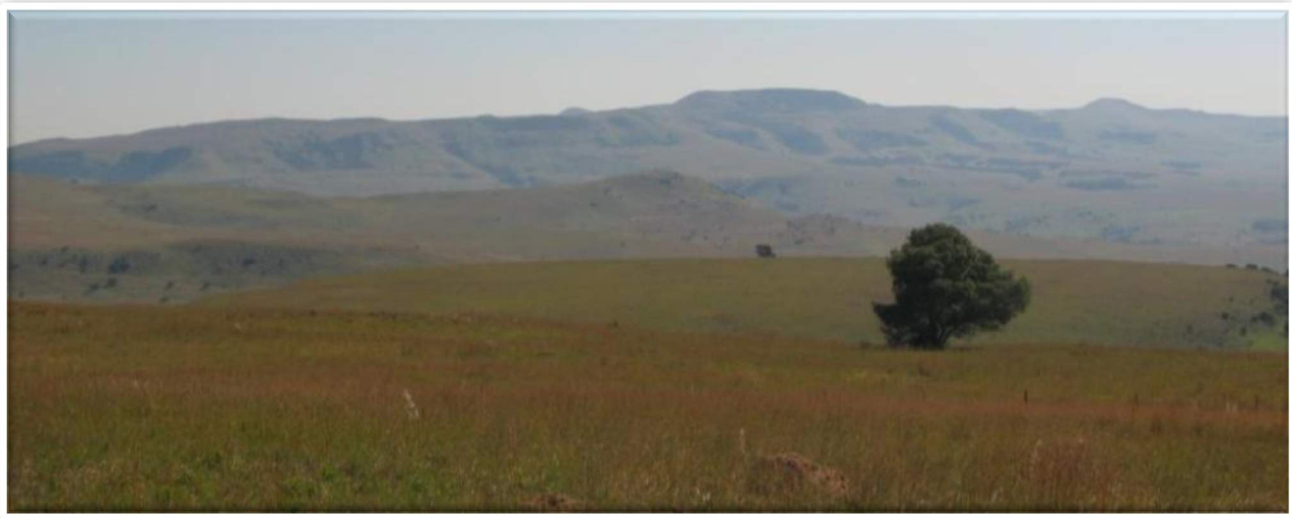


Figure 22:Photograph of local mountain grasslands vegetation

## 5.7 Rivers and Vlei Areas

The extent of wetlands within the greater underground mining area, as assessed in the Yzermyn Wetland Baseline and Impact Assessment, has an overall wetland extent (underground mining area and surface infrastructure footprint) of approximately 668 ha, approximately40% of the area. Both the Seep wetlands and the Channelled Valley Bottom wetlands score a Very High in terms of Ecological Importance and Sensitivity. This is due to the protected areas proposed and within the vicinity of the site, the current integrity of the site and the numerous species identified. Due to the pristine nature of the area and the land capability, the opportunities to provide future additional benefits is very low, however the threats to future benefits are extremely high due to the proposed mining in the area. (*Natural Scientific Services. 2013)*

The habitat integrities for the selected sites on the Mawandlane and Mkusaze Rivers, as assessed in the Yzermyn Aquatic Baseline and Impact Assessment, showed very few existing impacts on the system instream and riparian habitats which were classified as being largely natural to natural, with some more impacted riparian habitats which were classified as moderately modified during low flow due to significant erosion, decrease in indigenous vegetation and an increase in alien vegetation. (*Natural Scientific Services. 2013)*

WWF and Nedbank's Green Trust has been a driving force behind the protection of this region and in recognising the critical water production role of the high-altitude grasslands between KwaZulu Natal, Mpumalanga and the Free State (which provide water to the whole of Gauteng, as well as to several of South Africa's major power stations).The Wakkerstroom river biodiversity area is significant due to the importance of the area as a tourist destination and Birding SA heritage site.

Figure 23: Mountains forming backdrop to the Wakkerstroom vlei areas.

### 5.8 Existing Infrastructure

The N2 highway is sign cant for the proposed sidings and road users using the N2 national highway are mainly commercial and trucking, with some tourism. The R543 road would be used by coal trucks to transport coal to the sidings. The local district road would be used for access to the proposed mine.

Figure 24: Photograph of R543 landscape character

Figure 25: Photograph of local district road

## 5.9 Landscape Value

The proposed mine site falls within Southern Mpumalanga which is a site of rich floral and faunal endemism, an Important Bird Area (IBA) and the source of major river systems, namely the Usutu and Pongola Rivers *(www.wwf.org.za).* The site is situated between Wakkerstroom and Piet Retief and approximately 15 km from the small rural town of Dirkiesdorp, which has a population of approximately 350 people.

Adjacent land users are agricultural. Their sensitivity to the proposed landscape modifications would mostly be low as they would benefit from the increased access and improved road. Dirkiesdorp is a small rural village on the R543 which has a fairly dispersed settlement pattern. Scenic value of the town is moderate. Road users using the N2 national highway are mainly commercial and trucking, with some tourism.

The mountain areas are an important scenic resource and tourism in the area is closely linked to the natural landscape features such as mountains, rivers and wildlife. Much of the area to the south of the site remains nature tourism based. 23 600 hectares of privately-owned farmland extending from Wakkerstroom to Luneburg in the high altitude grasslands of southern Mpumalanga is a Protected Environment. According to the Biodiversity Assessment both types of wetlands score a *Very High* in terms of Ecological Importance and Sensitivity. This is due to the protected areas proposed and within the vicinity of the site, the current integrity of the site and the numerous species identified. Due to the pristine nature of the area and the land capability, the opportunities to provide future additional benefits is very low, however the threats to future benefits are extremely high due to the proposed mining in the area. (*Natural Scientific Services. 2013)*

Industry in Wakkerstroom is mainly based on tourism. This region also has a critical water production role due to the high-altitude grasslands. The Wakkerstroom river biodiversity area, the importance of the area as a tourist destination and as a Birding SA heritage site, adds has significance to the landscape value. Should the northern access route be utilised for the transportation of coal from the mine to the siding at Panbult or Piet Retief, transport trucks would come into the visual context of Wakkerstroom. Higher levels of contrast would be generated and the Class I visual resource management objectives would be exceeded.

There is an existing coal mining context surrounding the proposed siding site in Piet Retief scenic quality is low in both proposed Piet Retief and Panbult coal siding sites. The Piet Retief siding is located in close proximity to the town of Piet Retief, which is a timber and industrial node. Current scenic quality is lowered by the presence of the existing Jindal railway siding where coal stockpiles and trucks are located. Receptor sensitivities are low as the majority of users are industrial or agricultural. However, sensitivities of adjacent land users are rated high due to the close proximity of the site to the middle income residential area of Piet Retief.

# 6 SITE LANDSCAPE CHARACTER

In terms of the VRM methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and the distance of the proposed landscape modification from key receptor points.

The scenic quality is determined using seven key factors:

- **Land Form:** Topography becomes more of a factor as it becomes steeper, or more severely sculptured.
- **Vegetation:** Primary consideration given to the variety of patterns, forms, and textures created by plant life.
- **Water:** That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration.
- **Colour:** The overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) are considered as they appear during seasons or periods of high use.
- **Scarcity:** This factor provides an opportunity to give added importance to one, or all, of the scenic features that appear to be relatively unique or rare within one physiographic region.
- **Adjacent Land Use:** Degree to which scenery and distance enhance, or start to influence, the overall impression of the scenery within the rating unit.
- **Cultural Modifications:** Cultural modifications should be considered, and may detract from the scenery or complement or improve the scenic quality of an area.

Sensitivity levels are a measure of public concern for scenic quality. Receptor sensitivity to landscape change is determined using the following factors:

- **Type of Users:** Visual sensitivity will vary with the type of users, e.g. recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
- **Amount of Use:** Areas seen or used by large numbers of people are potentially more sensitive.
- **Public Interest:** The visual quality of an area may be of concern to local, or regional, groups. Indicators of this concern are usually expressed via public controversy created in response to proposed activities.
- **Adjacent Land Uses:** The interrelationship with land uses in adjacent lands. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be as visually sensitive.
- **Special Areas:** Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas, Scenic Roads or Trails, and Critical Biodiversity Areas frequently require special consideration for the protection of their visual values.
- **Other Factors:** Consider any other information such as research or studies that include indicators of visual sensitivity.

Two site surveys were undertaken on the 1$^{st}$ and 2$^{nd}$May 2012 and 1$^{st}$and 2$^{nd}$ July 2013. During the survey seven different locations, which are associated with the various landscape types, were surveyed during the field study to determine scenic quality, receptor sensitivity to landscape change and distance from nearest receptors. *See Figure 26: Proposed Site Landscape Survey Point Locality overlay onto Satellite Image Map* Making use of the ASTGTM survey data, a terrain model was generated for the area around the proposed project activity and using the viewshed the receptors for each activity were identified

The following landscapes were assessed on site and within the immediate surrounds:

- Mountains and Hills
- Mountain Pass
- River
- Prominent Ridgeline
- East facing grassy slopes
- Roads
- Railway

## 6.1 Proposed Mine Site

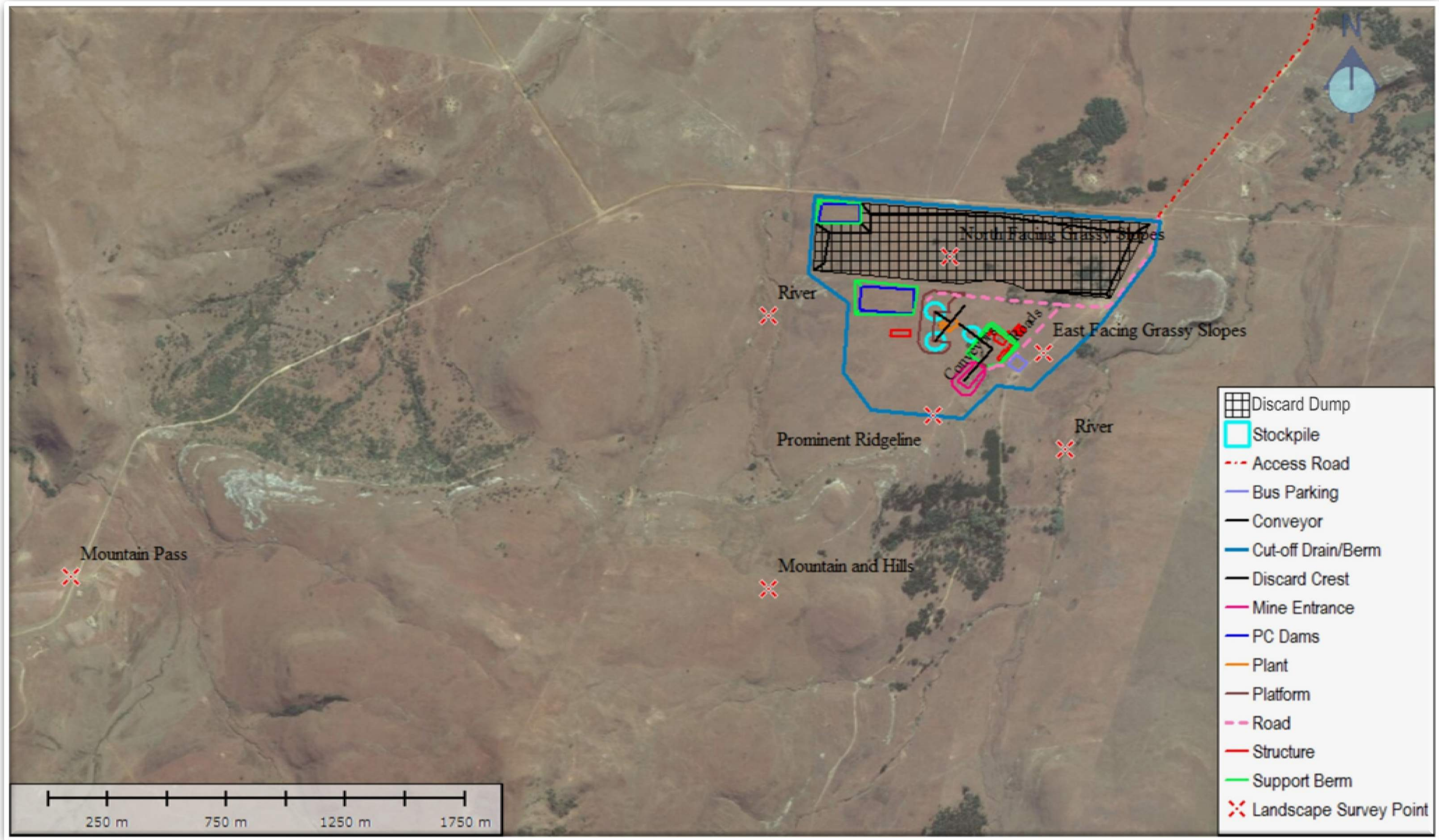



Figure 26: Proposed Site Landscape Survey Point Locality overlay onto Satellite Image Map

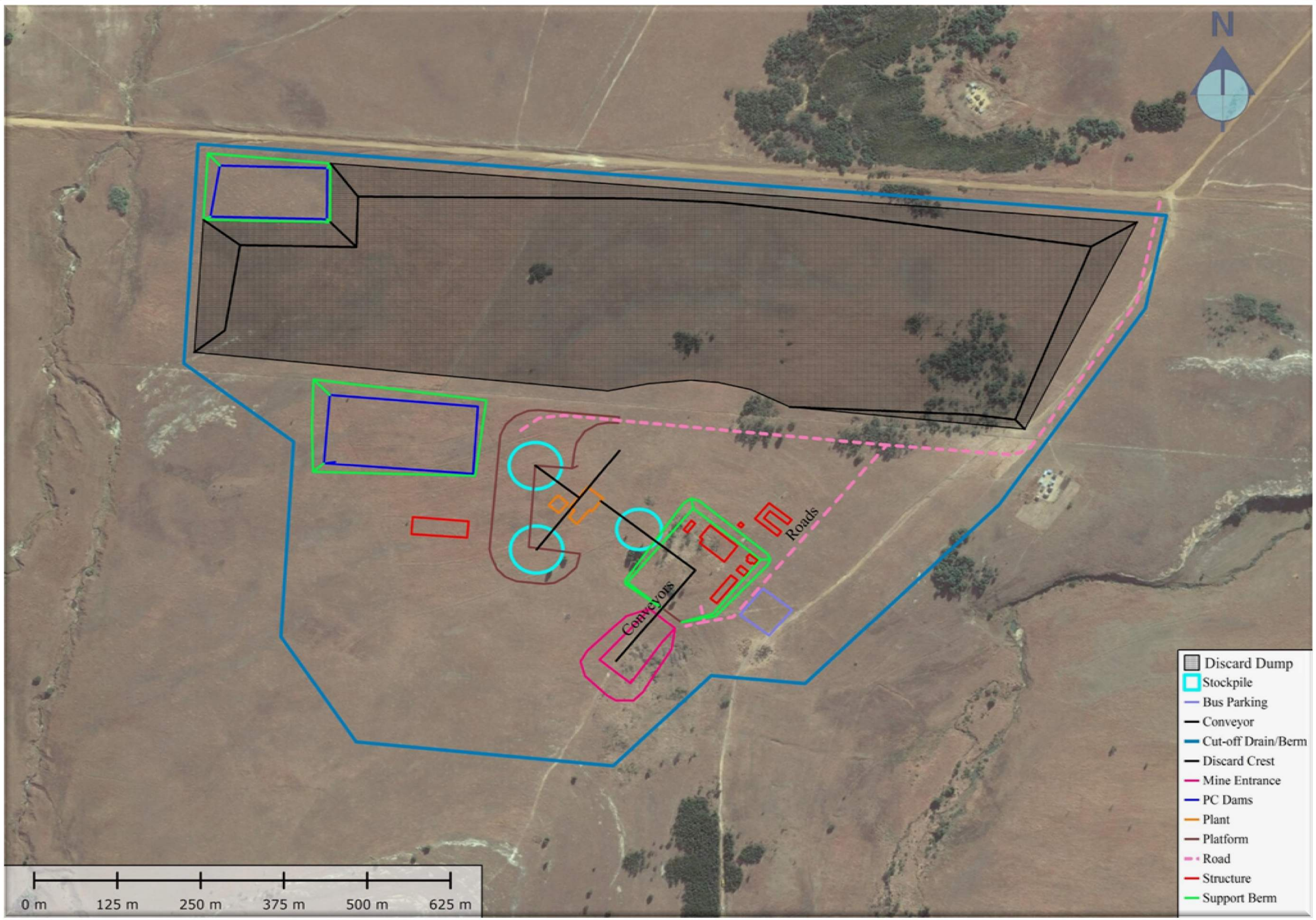



Figure 27: Proposed mine locality map overlay onto Satellite Imagery

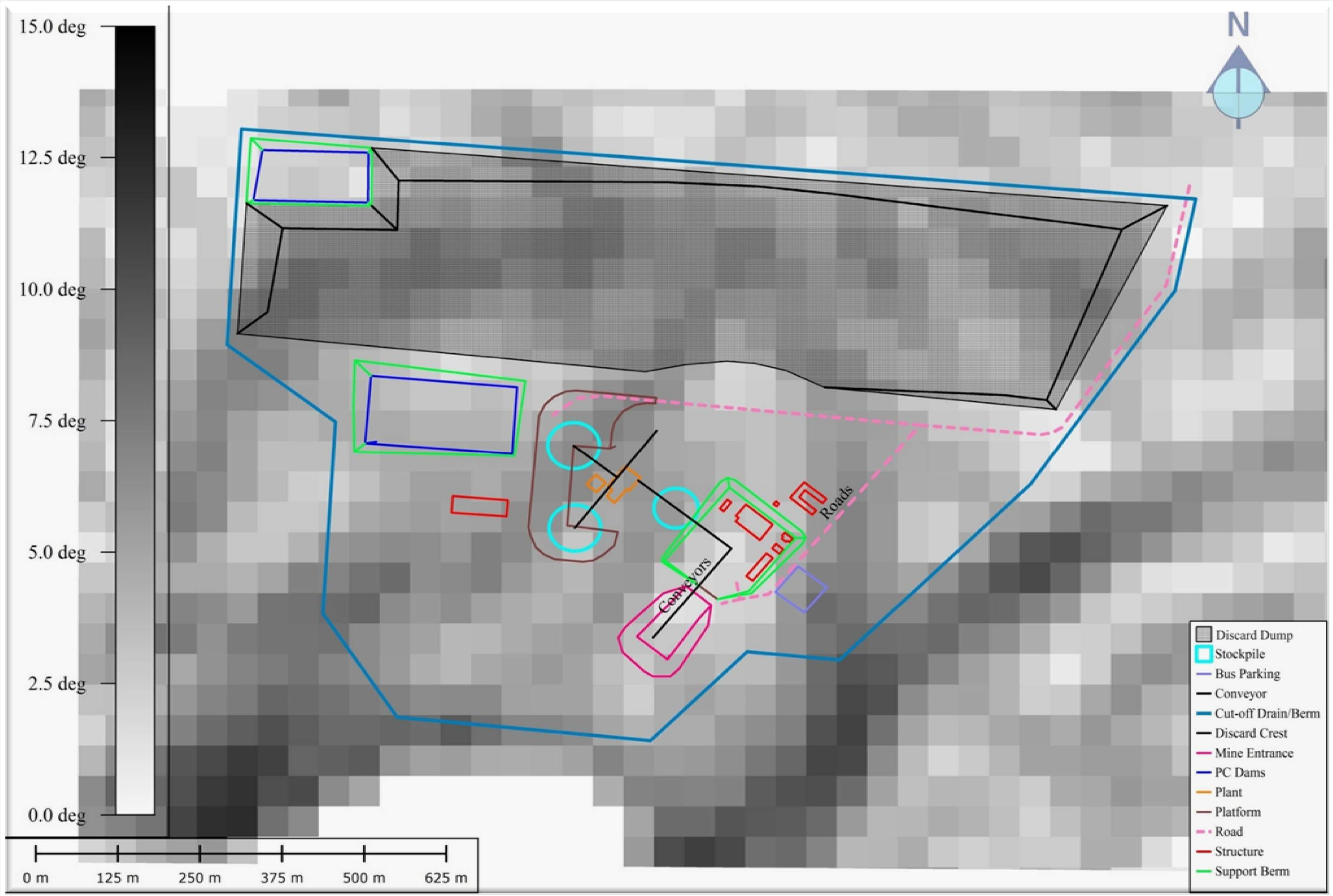



Figure 28: Slopes Map

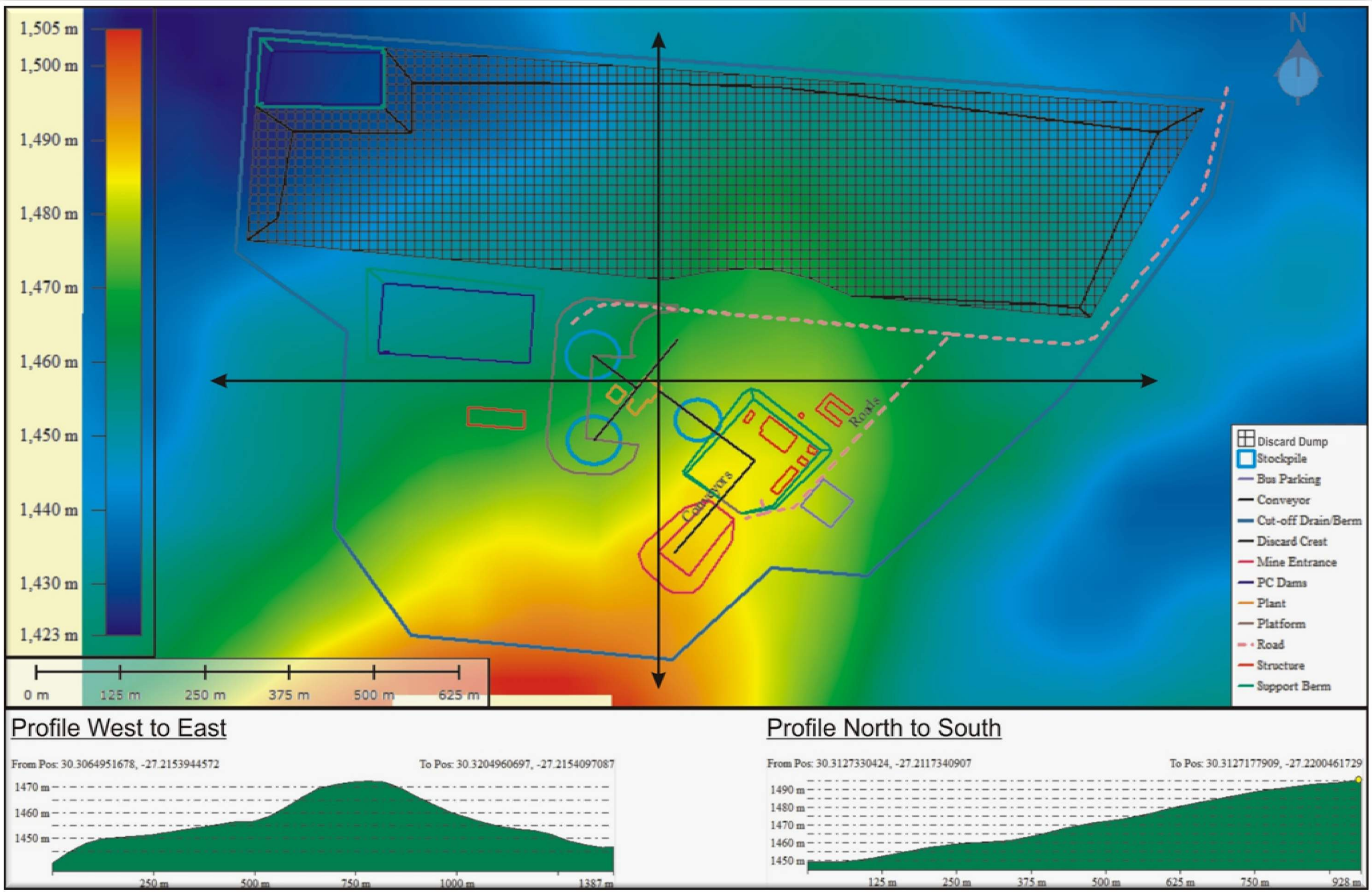



Figure 29: Proposed Elevation and Profile Map

Table 1: Proposed Mine Visibility, Zone of Visual Influence and Exposure Table

| Landscape | Proposed Activity | Landuse | Exposure | Viewshed | Zone of Visual Influence | Motivation |
|---|---|---|---|---|---|---|
| Ridgeline | No Activity | Agricultural | Moderate | High | High | These landscape features located to the south of the proposed mine site refer to the initial site proposal that was assessed during the scoping phase. Due to the remoteness of the location, surrounded by mainly rural agricultural landuse, receptors are reduced and receptor exposure was rated *low*. Recommendations in the scoping report was that these areas should not be utilised for mining activities as the viewshed generated from these areas would be extensive due to their prominent locations on the hillside. Due to the prominence, the ZVI would be higher as the viewshed would extend to the southern areas. These are more strongly associated with mountain and hill views. |
| River | No Activity | Natural | Moderate | High | High | |
| Mountain | No Activity | Natural | Moderate | High | High | |
| North facing grassy slopes | Mine: Plant, Workshops and Discard Dump | Agricultural | Moderate to High | Moderate to High | Moderate to High | Based on the recommendations of the specialist scoping reports, the proposed mine location was relocated to the north. This placed the site onto north facing grassy slopes with less visual prominence. The proposed mine plant and workshops are set back from the gravel road to the north which decreases the exposure to receptors. The discard dump is located adjacent to the gravel road to the north and receptors using this route would be subjected to high levels of exposure. However, it must be noted that the area is remote and predominantly restricted to limited agricultural traffic, moderating the exposure rating. The location of this new site is lower down the mountain on a wide convex foothill with a gentle slope to the north. The site is located below prominent ridgelines to the south-west and raised ground directly to the south and these two factors restrict views towards the mountain pass road. The mine viewshed is mainly north directional has a moderate to high coverage. The zone of visual influence of the site is rated *moderate to high* due to the northern focus of the viewshed where the terrain is characteristically undulating. This limits the direct influence of the mine to a smaller area around the proposed mine site. There is a small hill top section of the gazetted conservancy area that does fall within the proposed mine viewshed. These elevated locations are all located on mountain tops where access is restricted and hence have very few receptors. |
| East facing grassy slopes | Mine: Bus Turning Point | Agricultural | Moderate | Moderate to High | Moderate | The proposed bus turning point is located on steep east facing grassy slopes. The landuse is agricultural and therefore exposure to receptors would be moderated. As the site is raised above the terrain to the north and east, the viewshed is described as *moderate to high*. The ZVI of the proposed activity would be moderated by the smaller footprint of the site and the limited number of receptors located within the northern and eastern viewsheds. |

Table 2: Proposed Mine Scenic Quality Table

| Landscape | Proposed Activity | Landform | Vegetation | Water | Colour | Adj. Scenery | Scarcity | Cultural Modification | Total | Scenic Quality | Motivation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Prominent Ridgeline | No Activity | 3 | 2 | 3 | 3 | 4 | 3 | 0 | 18 | B | The mountain, ridgeline and river areas have higher levels of scenic quality due to interesting landform, enhanced colour variation and a higher scenic quality value for the adjacent scenery. As these landscapes are key elements in the landscape, the scenic quality scarcity value is rated *high*. None of these landscapes have been significantly impacted by cultural modifications, other than minor access roads for the lower areas of the hill. Due to a change in mine planning, the proposed mine site is not located on the ridgeline and no activities are planned close to these mountain landscape features. |
| River | No Activity | 3 | 3 | 4 | 3 | 4 | 4 | 0 | 21 | A | |
| Mountain | No Activity | 4 | 3 | 2 | 3 | 4 | 4 | 0 | 20 | A | |
| North facing grassy slopes | Mine: Plant, Workshops | 3 | 2 | 2 | 3 | 5 | 2 | 0 | 17 | B | Land use for most of the low-lying areas is agricultural and utilised for cattle grazing. Scenic quality is moderated by less prominent and undulating terrain, which is more strongly associated with agricultural impacts to vegetation. There are more access roads and there is closer proximity to alien vegetation. Adjacent scenery is still rated *high* due to the hill features to the south. The overall scenic quality rating is rated *moderate to high*. |
| East facing grassy slopes | Mine: Bus Turning Point | 2 | 2 | 2 | 2 | 5 | 2 | 0 | 15 | B | |

*(Key: A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11)*

Table 3: Proposed Mine Receptor Sensitivity Table

| Landscape | Proposed Activity | Type Users | Amount of use | Public interest | Adj. land users | Special areas | Receptor sensitivity | Motivation |
|---|---|---|---|---|---|---|---|---|
| Ridgeline | No Activity | High | Low | High | Medium | High | High | Should mining activities take place in these areas, public interest would be *high* due to the prominence of these landscape features. They are located in the northern foothills of a mountainous region to the south which is associated with Wakkerstroom tourism. The importance of the rivers relates to water legislation and management for agricultural usage. Due to the importance of maintaining the landscape integrity of these features in relation to regional tourism and municipal planning, these three landscapes were rated *high* as *special areas*. These areas are significant in maintaining biodiversity and regional landscape integrity, therefore they were identified as Class I areas (No-Go) in the scoping phase. As there is no existing precedent for mining in this rural area, the resultant change in landscape character experienced by the rural agricultural users would be strongly felt as an industrial node precedent would be set. The overall receptor sensitivity to landscape change on these sites is rated *high*. However, due to the change in mine planning, no activities are planned in these areas. |
| River | No Activity | High | Low | High | Medium | High | High | |
| Mountain | No Activity | High | High | High | Medium | High | High | |
| North facing grassy slopes | Mine: Plant, Workshops, | Medium | Medium | Medium | Medium | Medium | Medium to High | These sites have a lower elevation which is more associated with the rolling and undulating terrain of the rural agricultural areas to the north. Receptor sensitivity to landscape change on these sites would be moderated as these sites are not directly associated with the hilly areas to the south. However, as there is no existing precedent for mining in this rural area, the resultant change in landscape character experienced by the rural agricultural users would be strongly felt. Local communities in Dirkiesdorp and Wakkerstroom could have a potential positive interest in the proposed mine as a source of potential employment which moderates the receptor sensitivity to landscape change at the site where the mine is proposed. |
| East facing grassy slopes | Mine: Bus Turning Point | Medium | Low | Medium | Medium | Medium | Medium | |

## 6.2 Proposed Access Roads


Figure 30: Proposed Dirkiesdorp Access Route Map

Table 4: Access Roads Visibility, Zone of Visual Influence and Exposure Table

| Landscape | Activity | Landuse | Exposure | Viewshed | Zone of Visual Influence | Motivation |
|---|---|---|---|---|---|---|
| Mountain Pass | Access Road via the South*(Refer to Figure 26 above for location reference)* | District Road | Moderate | High | High | This location point, although not a proposed project access route, was included to take possible increased traffic. This traffic would access the mine from the southern areas, via the old R543 route, a gravel road routed over hilly areas to the south. The district route has *moderate* exposure as the number of receptors is limited in this remote location. Due to the prominence of the route, the viewshed would be *high*. Due to the higher scenic qualities of the surrounding hilly area and increased traffic utilising the road, the proposed mine site would be more noticeable and would have a higher ZVI. |
| Dirkiesdorp Steet and Gravel Access Road | Access Road adjacent to Dirkiesdorp | District Road | High | Moderate | High | The preferred access route is the district road via Dirkiesdorp. This is a gravel road currently utilised to access agricultural areas. It passes through the town of Dirkiesdorp where the exposure levels from residential and educational receptors would be *high*. Due to the undulating nature of the terrain, the viewshed would be moderated and views of the proposed coal trucks would be localised and *moderate*. Increased traffic would result in raised dust levels due to the gravel road. This would result in a higher ZVI. |
| Regional Road | R543 transport route to rail siding | National Road | High | Moderate | Low | The R543 is a regional road linking Wakkerstroom in the south to Piet Retief in the north. The road is tarred and used by many vehicles and trucks. Exposure to tourist and other traffic on the road would be *high.* However, the undulating terrain along the route would moderate the viewshed of coal trucks. As the route is currently utilised as a transport road with many trucks, the ZVI of increased coal trucks using the road would be rated as *low*. |

Table 5: Access Roads Scenic Quality Table

| Landscape | Activity | Landform | Vegetation | Water | Colour | Adj. Scenery | Scarcity | Cultural Modification | Total | Scenic Quality | Motivation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mountain Pass | Mountain Pass Road Access*(Refer to Figure 26 above for location reference)* | 4 | 3 | 3 | 3 | 5 | 4 | 0 | 22 | A | Although this existing gravel road is currently in a bad state of repair and would not attract traffic, the route has a high scenic quality due to its location in the mountainous area. There are wide, open views of the surrounding hill and valley landscapes with limited cultural modifications. The road also meanders along the side of the mountain, through steep-sided slopes, which adds value to the landform and to the scarcity scenic quality attributes. The road crosses many mountain streams which increases value and colour variation through vegetation diversity. The scenic quality was rated *high* for this area. |
| Dirkiesdorp Steet and Gravel Access Road | Access Road adjacent to Dirkiesdorp | 2 | 1 | 2 | 1 | 2 | 1 | -2 | 7 | C | The scenic quality comments refer to the section of gravel road which links the proposed mine site to the town of Dirkiesdorp. The terrain is gently undulating and vegetation has been modified to create the road for local agriculture. The road crosses several streams which increases the scenic quality, with changes in vegetation along the river courses adding colour variation to the browns associated with the veld grasses. Adjacent landscapes are fairly fragmented by the undulating terrain and the clumping of alien vegetation (such as *Acacia melanoxylon, Acacia mearnsii, Eucalyptus camaldulensis Dehnh).*The landscape is common in both the localised and regional area. Cultural modifications along most of the road are rural agricultural in nature and include fences and small, clustered communities. Around the town the landscape becomes cluttered with ad hoc dwellings which increase contrasts of form, colour, texture and line. The scenic quality levels in this area are therefore lowered. |
| Regional Road | R543 transport route to rail siding | 2 | 2 | 2 | 2 | 2 | 1 | 0 | 11 | C | The route is aligned though gentle undulating landform with a *medium to low* scenic quality value. Vegetation has been altered for agriculture and together with the undulating landform, fragments the landscape. There are no obvious water features and alien vegetation is prevalent. Cultural modifications are mainly those of agricultural infrastructure, including some powerlines and telephone lines with scattered farmsteads. The overall scenic quality was rated *moderate to low* along this stretch of road. |

*(Key: A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11)*

Table 6: Access Roads Receptor Sensitivity Table

| Landscape | Photo Point | Type Users | Amount of use | Public interest | Adj. land users | Special areas | Receptor sensitivity | Motivation |
|---|---|---|---|---|---|---|---|---|
| Mountain Pass | Mountain Pass Road Access*(Refer to Figure 26 above for location reference)* | High | Low | High | High | High | High | Receptor sensitivities are higher due to the value that this route offers for existing or potential tourism expansion in the area. However, there is low usage of the area. There are *high* scenic qualities due to the elevated views and closed landscapes of the valley areas in conjunction with its close proximity to the tourist node of Wakkerstroom. |
| Dirkiesdorp Steet and Gravel Access Road | Access Road adjacent to Dirkiesdorp | Medium | Low | Medium | Medium | Low | Medium | The road is directly adjacent to the town. Currently the road is gravel and vehicles travelling on the road generate dust for the residential area of the receptors. Public interest is higher due to *high* levels of exposure. Adjacent land users are agricultural whose sensitivity to the landscape modifications would be *low* as they would benefit from the increased access and improved road. There would be a change in land use associated with the mine and the upgrade to the road could also add value to local receptors. |
| Regional Road | R543 transport route to rail siding | Medium | High | Low | Medium | Medium | Low | The R543 would have *low* receptor sensitivity to the proposed increase in trucks to transport coal as the precedent for transport truck using the route already exists. |

### 6.3 Proposed Jindal Siding (Piet Retief)


Figure 31: Proposed Piet Retief Coal Siding Site Map

Table 7: Jindal Siding Visibility, Zone of Visual Influence and Exposure Table

| Activity | Landscape | Landuse | Exposure | Viewshed | Zone of Visual Influence | Motivation |
|---|---|---|---|---|---|---|
| Piet Retief coal siding (Jindal) | Railway | Railway siding | Moderate | Moderate | Moderate to Low | Jindal siding is an existing, well established railway siding located in Piet Retief. The viewshed is moderated by localised tree screening in the area and it is contained in a lower lying area. The viewshed does include residential receptors, but they are located some distance away with *moderate* exposure to the site. As the site is a well established coal siding, the influence of the expansion of the site is rated *moderate to low.* |

Table 8: Jindal Siding Scenic Quality Table

| Activity | Landscape | Landform | Vegetation | Water | Colour | Adj. Scenery | Scarcity | Cultural Modification | Total | Scenic Quality | Motivation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Piet Retief coal siding (Jindal) | Railway | 2 | 0 | 2 | 1 | 2 | 1 | -2 | 7 | C | The site is used for loading coal at the existing railway line siding. The scenic quality is *moderate to low* as the area lies in close proximity to the town of Piet Retief, which is a timber and industrial node for the region. The scenic quality is lowered by the presence of existing coal stockpiles and trucks atJindal railway siding. |

*(Key: A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11)*

Table 9: Jindal Siding Receptor Sensitivity Table

| Photo Point | Landscape | Type Users | Amount of use | Public interest | Adj. land users | Special areas | Receptor sensitivity | Motivation |
|---|---|---|---|---|---|---|---|---|
| Piet Retief coal siding (Jindal) | Railway | High | Medium | Medium | Low | Low | Medium | The area where the proposed coal siding is located is in visual proximity to the upper middle income residential areas of Piet Retief. The current coal siding is partially screened from receptor views by screening trees. The townscape is industrial and the coal siding does already exist, but on a smaller scale than the proposed siding. The adjacent landuse is agricultural and industrial. There is a river adjacent to the site which would need to be taken into consideration. Receptor sensitivity would be moderated by the existing precedent as long as the existing smaller scale remains. |

## 6.4 Proposed Panbult Siding


Figure 32: Proposed Panbult Coal Siding Site Map

Table 10: Panbult Siding Visibility, Zone of Visual Influence and Exposure Table

| Activity | Landscape | Landuse | Exposure | Viewshed | Zone of Visual Influence | Motivation |
|---|---|---|---|---|---|---|
| Panbult coal siding | Railway | Railway siding | High | Low | Low | The Panbult siding is an existing, well established railway siding located on the N4. The area also includes industrial nodes and a grain silo. The viewshed is contained by surrounding forestry, the grain silo and railway infrastructure but does include *high* exposure to receptors using the N2 national road. As the site is strongly modified and includes a well established coal siding, the ZVI is rated as *low*. |

Table 11: Panbult Siding Scenic Quality Table

| Activity | Landscape | Landform | Vegetation | Water | Colour | Adj. Scenery | Scarcity | Cultural Modification | Total | Scenic Quality | Motivation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Panbult coal siding | Railway | 14 | 1 | 2 | 1 | 1 | 1 | -4 | 3 | C | The proposed coal siding would be used for loading coal at the existing Panbult railway line siding. The siding scenic quality is *very low* due to the existing station, coal siding and corn storage silos, as well as some timber industry infrastructure located in close proximity to the proposed area. There is some scenic value to the north of the site where there is a water feature and wetland which should be retained. The increase in storage of coal to the south of the railway line would not impact the sense of place of the area, which is already strongly modified. |

*(Key: A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11)*

Table 12: Panbult Siding Receptor Sensitivity Table

| Photo Point | Landscape | Type Users | Amount of use | Public interest | Adj. land users | Special areas | Receptor sensitivity | Motivation |
|---|---|---|---|---|---|---|---|---|
| Panbult coal siding | Railway | Low | High | Low | Low | Low | Low | Users are mainly truckers, with some commercial use, and receptors will have a *low* sensitivity to changes at the Panbult siding. There is increased usage due to the close proximity of the receptors to the siding. The area is already well established as a coal siding and dominates the surrounding sense of place. The adjacent land use is a timber plantation and the proposed landscape modification would not alter the existing landscape character. Receptor sensitivity would be *low*. |

## 6.5 Visual Resource Management Classes

The table below is utilised to define the Visual Resource Management (VRM) Classes that represent the relative value of the visual resources of an area:

i. **Classes I and II** are the most valued;
ii. **Class III** represents a moderate value; and
iii. **Class IV** is of least value.

- The **Class I** objective is to preserve the existing character of the landscape, where the level of change to the characteristic landscape should be very low, and must not attract attention. **Class I** is assigned to those areas where a ***specialist decision*** has been made to maintain a natural landscape.
- The **Class II** objective is to retain the existing character of the landscape and the level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer, and should repeat the basic elements of form, line, colour and texture found in the predominant natural features of the characteristic landscape.
- The **Class III** objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- The **Class IV** objective is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the landscape can be high, and these management activities may dominate the view and be the major focus of the viewer's (s') attention.

This is undertaken making use of the matrix below developed by USA Bureau of Land Management (BLM) Visual Resource Management method as seen below, which is then represented in a visual sensitivity map.

Table 13: VRM Matrix Table

| | | **VISUAL SENSITIVITY LEVELS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | High | | | Medium | | | Low | | |
| **SCENIC QUALITY** | A (High) | II | II | II | II | II | II | II | II | II |
| | B (Medium) | II | III | III/ IV * | III | IV | IV | IV | IV | IV |
| | C (Low) | III | IV | IV | IV | IV | IV | IV | IV | IV |
| **DISTANCE ZONES** | | Fore/middle ground | Background | Seldom seen | Fore/middle ground | Background | Seldom seen | Fore/middle ground | Background | Seldom seen |

*(A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11)*

* If adjacent areas are **Class III** or lower, assign **Class III**, if higher, assign **Class IV**

Table 14: VRM Table for Proposed Mine Activities

| Activity | VRM Class | Motivation |
|---|---|---|
| Mountain areas to the south | Class II | VRM Class II allows *low* levels of change to the existing landscape. The objective is to *retain* the existing character of the landscape where proposed activities may be seen, but should not attract the attention of the casual observer. |
| Mine: Plant, Workshops | Class III | VRM Class III allows for *moderate* levels of change to the existing landscape. The objective is to *partially retain* the existing character of the landscape where proposed activities may attract attention, but should not dominate the view of the casual observer. The proposed sites would have a *moderate* scenic quality. There would be higher rural agricultural receptor sensitivity due to the precedent that would be set should mining rights be granted. Although the Class III objective allows for landscape modification, mitigation would be required to ensure that the change in landscape character is contained as much as possible. Post mining landscapes should be returned back to a state that would not dominate the views of casual observer. This statement is supported by Gert Sibande District Municipality SDF which states that where major mining precincts coincide with high-potential extensive agricultural land and some of the ecological corridors it is essential that mining activity be concentrated within already affected areas, and be managed in such a way that the original agricultural/tourism value of the land is restored once mining activities close down. This would require that a proper Environmental Management Plan for mining activities in the District be put in place, and that it be properly implemented and continuously monitored. This is of critical importance within the proposed tourism and conservation belt, as some of the mining activities are located relatively close to the sensitive environments around Chrissiesmeer. (*Gert Sibande District Municipality SDF. 2009)* |
| Mine: Bus Turning Point | Class III | |
| Access Road adjacent to Dirkiesdorp | Class III | |
| R543 transport route to rail siding | Class III | |
| Piet Retief coal siding (Jindal) | Class III | Receptor sensitivities are lower as the existing landuse is a coal siding. However, adjacent land user sensitivities would be higher due to closer proximity of the site to the residential area of Piet Retief. Overall the VRM Class is rated as Class III, because mitigation would be required to ensure that the local residential receptors are not exposed to higher levels of visual intrusion from the coal stockpiles, coal dust and movements of the trucks. |
| Panbult coal siding | Class IV | VRM Class IV allows for *high* levels of change to the existing landscape. The objective is to provide for proposed activities which require major modifications of the existing character of the landscape, and these management activities may dominate the view and be the major focus of the viewer's (s') attention. This scenic quality is *very low* and receptor sensitivity to landscape change at the location is also low making this a suitable location for development. |

# 7 KEY OBSERVATION POINTS AND CONTRAST RATING

**Key Observation Points (KOP)**

KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations are important in terms of the VRM methodology, which requires that the Degree of Contrast (DoC) that the proposed landscape modifications will make to the existing landscape is measured from these most critical locations, or receptors, surrounding the property.

To define the KOPs, potential receptor locations were identified in the viewshed analysis, and screened, based on the following criteria:

- Angle of observation;
- Number of viewers;
- Length of time the project is in view;
- Relative project size;
- Season of use;
- Critical viewpoints, e.g. views from communities, road crossings; and
- Distance from property.

Making use of the above criteria, the following Key Observation point locations for each of the proposed activities were identified, as indicated in the map below:

- Mine Site Key Observation Points
  - Gravel Road Eastbound;
  - Gravel Road Westbound;
- Dirkiesdorp Access Route Key Observation Points
  - Sinethemba Agricultural High School
  - Dirkiesdorp
- Piet Retief Siding Key Observation Points
  - Piet Retief Residential
  - R33 ( N2 Highway)
- Panbult siding Key Observation Points
  - N2 Highway

**Contrast Rating**

The contrast rating, or impacts assessment phase, is undertaken after the inventory process has been completed. The suitability of landscape modification is assessed by assessing the degree of potential contrast from the proposed activity in comparison to the existing contrast created by the existing landscape. This is done by evaluating the level of change to the existing landscape by assessing the line, colour, texture and form, in relation to the visual objectives defined for the area. The following criteria are utilised in defining the DoC:

- **None** : The element contrast is not visible or perceived.
- **Weak** : The element contrast can be seen but does not attract attention.
- **Moderate** : The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong** : The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

As an example, in a Class I area, the visual objective is to preserve the existing character of the landscape, and the resultant contrast to the existing landscape should not be notable to the casual observer and cannot attract attention. In a Class IV area example, the objective is to provide for proposed landscape activities which require major modifications of the existing character of the landscape. Based on whether the VRM objectives are met, mitigations, if required, are defined to avoid, reduce or mitigate the proposed landscape modifications so that the visual impact does not detract from the surrounding landscape sense of place.

As a component in this contrast rating process, visual representation, such as photo montages are vital in large-scale modifications, as this serves to inform Interested and Affected persons (I&APs) and decision-making authorities of the nature and extent of the impact associated with the proposed project. There is an ethical obligation in this process, as visualisation can be misleading if not undertaken ethically. In this regard, VRM Africa subscribes to the proposed Interim Code of Ethics for Landscape Visualisation developed by the Collaborative for Advanced Landscape Planning (CALP)*(Sheppard, S.R.J., 2005)*.*See Annexure 4: Methodology for further details.*This code states that professional presenters of realistic landscape visualisations are responsible for promoting full understanding of proposed landscape changes, providing an honest and neutral visual representation of the expected landscape, by seeking to avoid bias in responses and demonstrating the legitimacy of the visualisation process. Presenters of landscape visualisations should adhere to the principles of:

- Access to Information;
- Accuracy;
- Legitimacy;
- Representativeness;
- Visual Clarity; and
- Interest.

## 7.1 Mine Site Photomontages and Contrast Rating Table

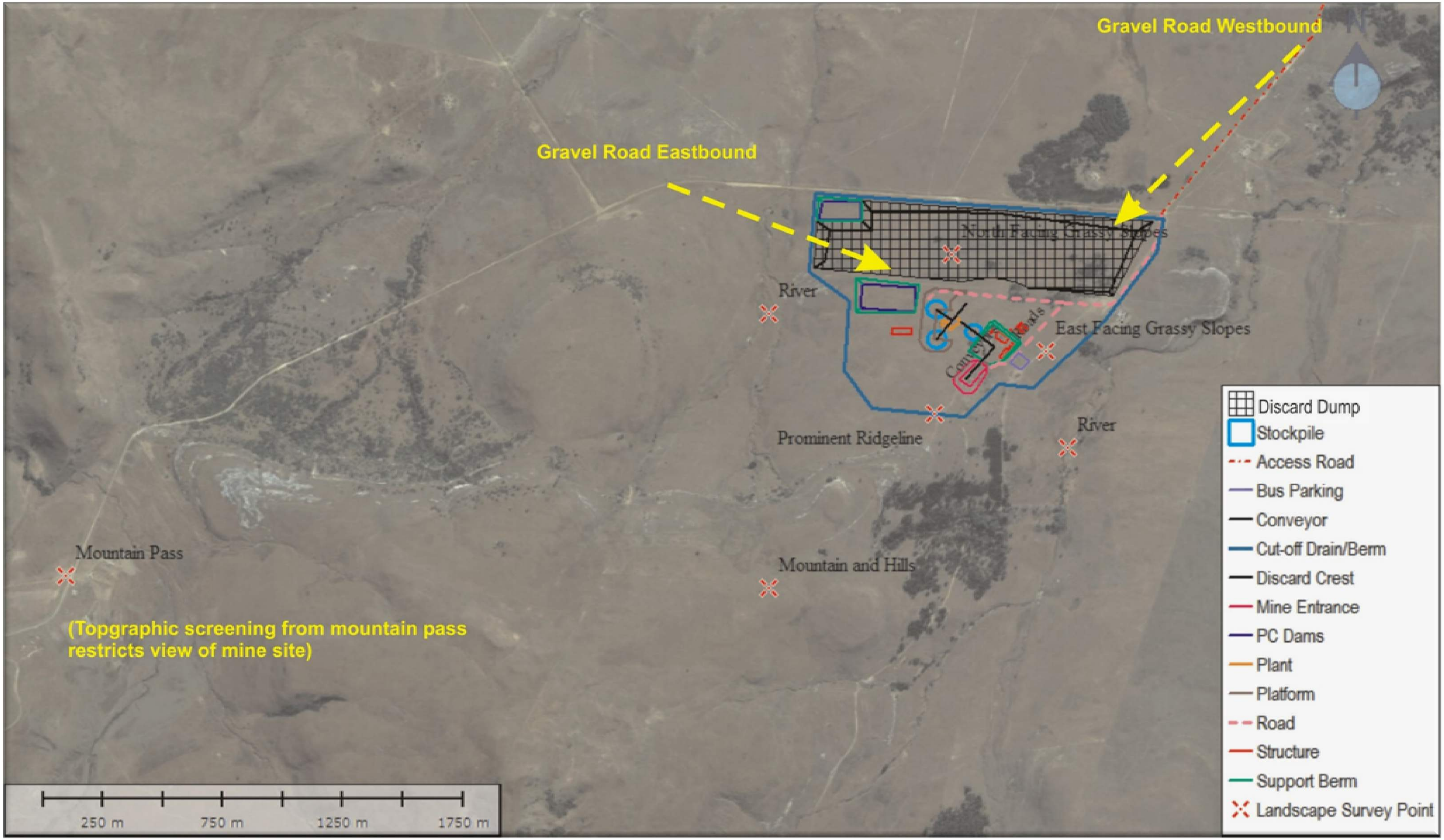



Figure 33: Mine Site Key Observation Point Locality Map

### 7.1.1 *Photomontage of Gravel Road Eastbound KOP*

Existing view


Photomontage of proposed development **For illustrative purposes only**

Figure 34: Photomontage: View from Gravel Road Eastbound (Approx. 750m)

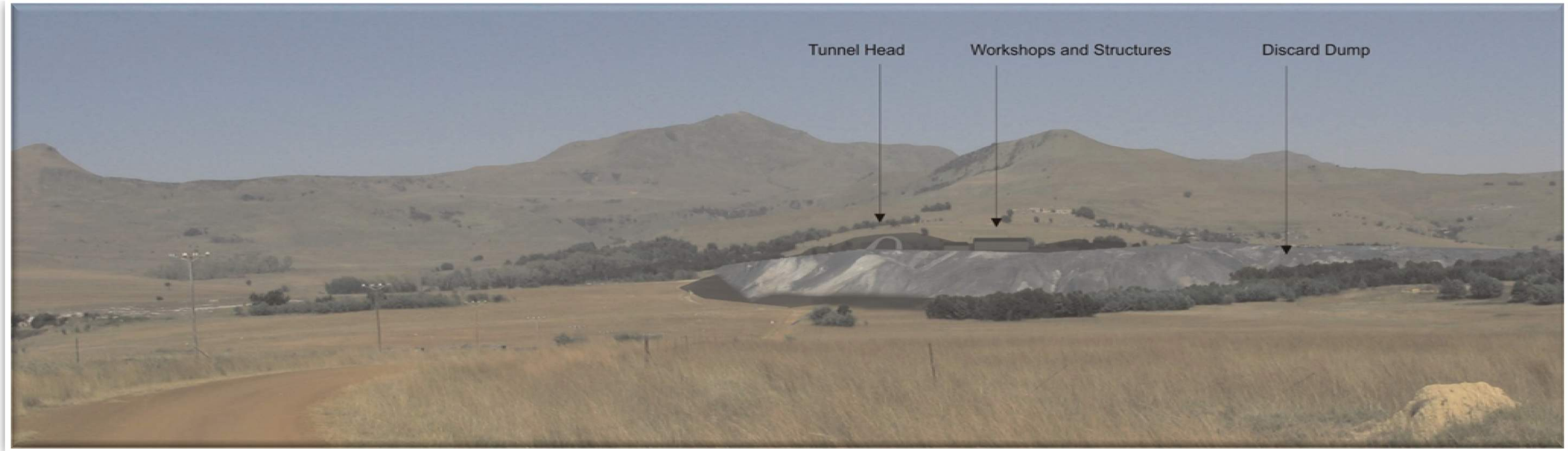
Table 15: Mine Site Contrast Rating Table (view eastbound)

| KOP: GRAVEL ROAD EASTBOUND (MINE) | | | | | | | Project: | | Component: |
|---|---|---|---|---|---|---|---|---|---|
| **Impact Description** | **Class** | **Form** | **Line** | **Colour** | **Texture** | **DoC** | **Degree of Contrast Motivation** | **Objective Met?** | **Mitigation** |
| Construction | III | S | M | S | S | **M/S** | There are no other man-made forms within this view, so all construction will generate *strong* contrast. Lines created will be mostly horizontal, hence only *moderate* contrast to the existing horizontal view. Colours and textures of man-made materials will be of a stronger intensity and visually of a darker tone, or reflective in nature, and hence will create a *strong* contrast to existing natural, mid tone and mid intensity colours (ochre's, browns, greens). There are no other greys similar to the discard dump in the view and the black of the coal will be of a much darker and even tone than other dark colours in the view. | **No** | The existing natural sense of place will be changed completely. Any landscape modifications must be visually contained using screening and continual rehabilitation of the discard dump. The change to the sense of place must be localised as much as possible. Dust controls must be continually implemented.Colour mitigation for structure walls painted earth tones with a grey hue and roof colour slate grey (same colour theme for all structures unless required otherwise for safety warning). Plants, pipes, conveyors and accessory works infrastructure to be painted mid-grey unless required otherwise for safety warning. Retaining walls to be brown in colour. |
| Operation | III | S | S | S | S | **S** | | **No** | |
| Closure | III | M | W | W | W | **W** | The discard dump will remain, yet it echoes the basic shapes of the existing landscape (long, low, undulating), so only a *moderate* contrast is generated. | **Yes with Mit.** | All buildings and man-made infrastructure must be removed. The discard dump must be completed rehabilitated using local grasses. |

*(Key: N= None, W=Weak, M=Moderate, S=Strong, Mit = Mitigation)*

### 7.1.2 *Photomontage of Gravel Road Westbound KOP*

Existing view




Photomontage of proposed development **For illustrative purposes only**

Figure 35: Photomontage: View from Gravel Road Westbound(Approx. 750m)

Table 16: Mine Site Contrast Rating Table (view westbound)

| KOP: GRAVEL ROAD WESTBOUND (MINE) | | | | | | | Project: | | Component: |
|---|---|---|---|---|---|---|---|---|---|
| **Impact Description** | **Class** | **Form** | **Line** | **Colour** | **Texture** | **DoC** | **Degree of Contrast Motivation** | **Objective Met?** | **Mitigation** |
| Construction | III | S | M | S | S | **M/S** | There are no other man-made forms within this view, so all construction will generate *strong* contrast. Lines created will be mostly horizontal, hence only *moderate* contrast to the existing horizontal view. Colours and textures of man-made materials will be of a stronger intensity and visually of a darker tone, or reflective in nature, and hence will create a *strong* contrast to existing natural, mid tone and mid intensity colours (ochre's, browns, greens). There are no other greys similar to the discard dump in the view and the black of the coal will be of a much darker and even tone than other dark colours in the view. | **No** | The existing natural sense of place will be changed completely. Any landscape modifications must be visually contained using screening and continual rehabilitation of the discard dump. The change to the sense of place must be localised as much as possible. Dust controls must be continually implemented.Colour mitigation as for Gravel Road Eastbound. |
| Operation | III | S | S | S | S | **S** | | **No** | |
| Closure | III | M | W | W | W | **W** | The discard dump will remain, yet it echoes the basic shapes of the existing landscape (long, low, undulating), so only a *moderate* contrast is generated. All modifications fall within the lower, middle ground and hence do not obstruct views of the hills behind. | **Yes with Mit.** | All buildings and man-made infrastructure must be removed. The discard dump must be completed rehabilitated using local grasses. |

*(Key: N = None, W = Weak, M = Moderate, S = Strong, Mit = Mitigation)*

## 7.2 Dirkiesdorp Photographs and Contrast Rating Table


Figure 36:Dirkiesdorp Access Route Receptor View Point Locality overlay onto Satellite Image Map

***Dirkiesdorp / Sinethemba School Access Route KOP***

For the new roads, and upgrading of existing road infrastructure, the following receptors were identified as falling within the viewshed and making use of the visual resources located where the proposed activities would operate.This area was classed as a Class III area which allows for moderate modifications. Due to the moving nature of the trucks, no photomontage was undertaken from this KOP.

Figure 37:Photograph of the proposed access road adjacent the Sinethemba Agricultural School

Table 17: Dirkiesdorp Contrast Rating Table

<table>
<tr><th colspan="7">KOP: SINETHEMBA SCHOOL/ DIRKIESDORP</th><th>Project: YZERMYN COAL MINE</th><th></th><th>Component: ROADS/MINE</th></tr>
<tr><th>Impact Description</th><th>Class</th><th>Form</th><th>Line</th><th>Colour</th><th>Texture</th><th>DoC</th><th>Degree of Contrast Motivation</th><th>Objective Met?</th><th>Mitigation</th></tr>
<tr><td>Construction</td><td>III</td><td>M/W</td><td>W</td><td>M/S</td><td>M/S</td><td>M</td><td rowspan="2">Increased traffic will increase noise and dust levels. Colours and glint from the vehicles will generate moderate to strong levels of contrast, markedly changing the rural agricultural sense of place.</td><td>Yes with Mit.</td><td rowspan="2">Road and coal dust levels need to be controlled to protect the proximate housing and school. The road must be tarred. Speed controls will need to be set in place. Pedestrian access and crossings will need to be looked at and fencing along the road erected.</td></tr>
<tr><td>Operation</td><td>III</td><td>M/W</td><td>W</td><td>M/S</td><td>M/S</td><td>M</td><td>Yes with Mit.</td></tr>
<tr><td>Closure</td><td>III</td><td>W</td><td>W</td><td>W</td><td>W</td><td>W</td><td></td><td>Yes</td><td>Traffic will be reduced and original context will return. All buildings and man-made infrastructure must be removed and area rehabilitated.</td></tr>
</table>

*(Key: N = None, W = Weak, M = Moderate, S = Strong, Mit = Mitigation)*

## 7.3 Piet Retief Siding Photographs and Contrast Rating Table

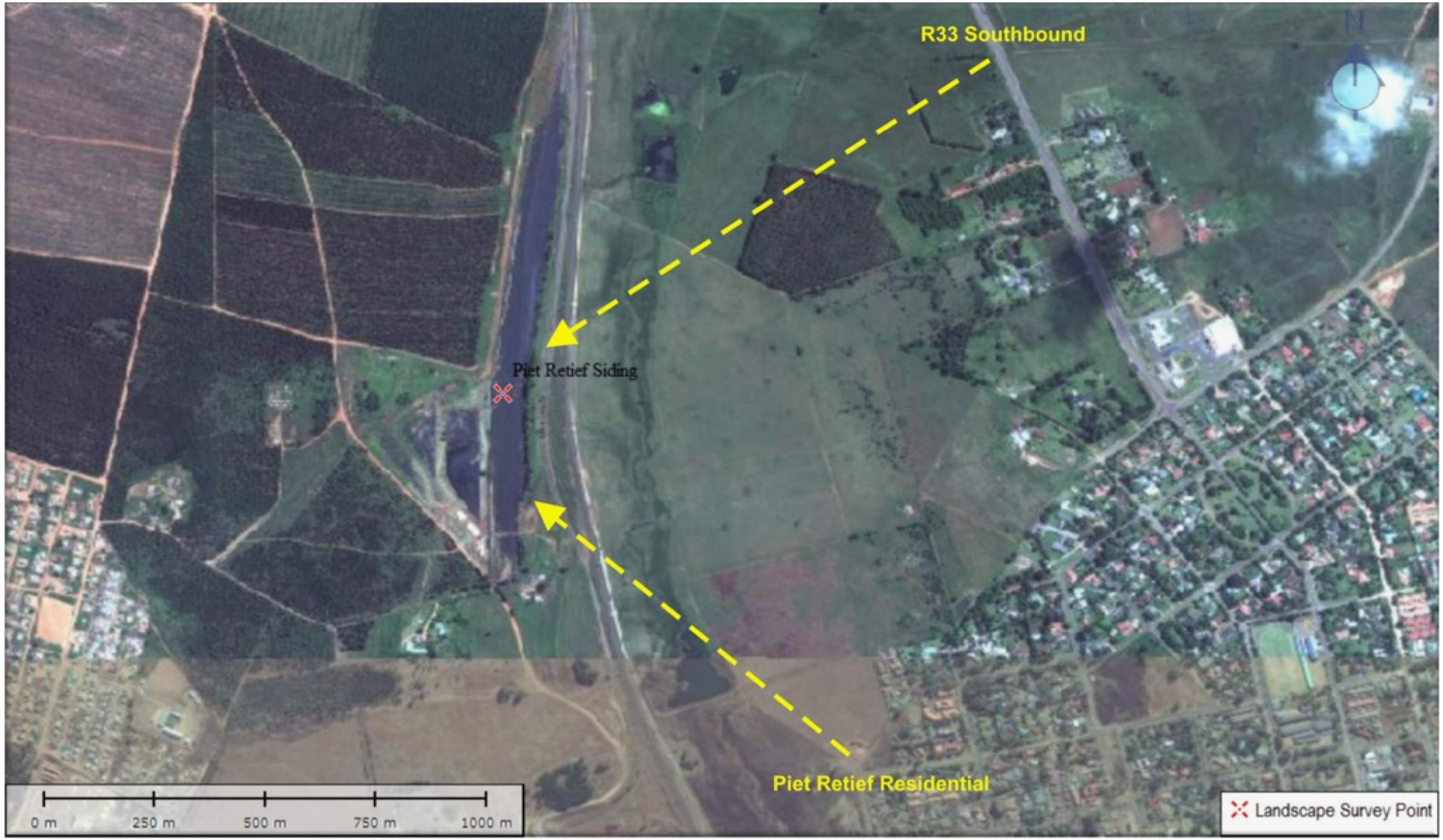


Figure 38:Piet Retief Siding Receptor View Point Locality overlay onto Satellite Image Map

***Piet Retief Siding Site Key Observation Points***

For the Piet Retief siding site, the following receptors were identified as falling within the viewshed and making use of the visual resources located where the proposed activities would be sited. This area was classed as a Class III area which allows for moderate modifications.

*R33 (N2 Highway)*
This area is classed as Class IV with a recommendation that mitigation is not required. No photomontage was therefore necessary from this KOP.


Figure 39: Photograph of towards the siding as seen from the R33 (N2) highway

Table 18: Piet Retief Siding Contrast Rating Table (R33/N2)

| **KOP: R33/ N2 HIGHWAY** | | | | | | | **Project: YZERMYN COAL MINE** | | **Component: PIET RETIEF SIDING** |
|---|---|---|---|---|---|---|---|---|---|
| **Impact Description** | **Class** | **Form** | **Line** | **Colour** | **Texture** | **DoC** | **Degree of Contrast Motivation** | **Objective Met?** | **Mitigation** |
| Construction | IV | M/W | W | M | M | **M/W** | Lines will be mostly long, horizontal and similar to existing lines in the view. The dark forms of the coal heaps will generate a *moderate* contrast due to the line of dark trees in the background. Movement, dust and glint will generate *moderate* levels of textural contrast. Forms will be *low* and regular, similar to other forms seen in the view. | **Yes** | The Class IV visual objectives will be met. However, it is recommended that a line of screening trees be planted and the access road be tarred. |
| Operation | IV | M/W | M/W | M | M | **M/W** | Movement of trucks and the diagonals of the heaps will generate higher levels of contrast, especially at this distance. | **Yes** | |
| Closure | IV | W | W | W | W | **W** | No change as siding is not linked to closure of the mine | **Yes** | Not applicable |

*(Key: N = None, W = Weak, M = Moderate, S = Strong, Mit = Mitigation)*

*Piet Retief Residential*

This area is classed as Class III which allows for moderate levels of change to the landscape. This area was classed as a Class III area which allows for moderate modifications. Due to the existing siding landscape character of the site, no photomontage was undertaken from this KOP.


Figure 40: Photographs of Piet Retief siding as seen from the survey point

Table 19: Piet Retief Contrast Rating Table (Residential)

| **KOP: PIET RETIEF RESIDENTIAL** | | | | | | | **Project: YZERMYN COAL MINE** | | **Component: PIET RETIEF SIDING** |
|---|---|---|---|---|---|---|---|---|---|
| **Impact Description** | **Class** | **Form** | **Line** | **Colour** | **Texture** | **DoC** | **Degree of Contrast Motivation** | **Objective Met?** | **Mitigation** |
| Construction | **III** | W | W | M | M | **M/W** | Lines will be mostly long horizontal, similar to existing lines in the view. The dark forms of the coal heaps will generate a moderate contrast due to the line of dark trees in the background. Movement, dust and glint will generate *moderate* levels of textural contrast. Forms will be low and regular, similar to other forms seen in the view. | **Yes with Mit.** | The Class **III** objectives will only be met if the scale of the siding is not too large. The residential receptors are within the fore- and middleground. Dust, movement and glint will have to be controlled to reduce visual intrusion. A line of screening trees will need to be planted and the access road tarred. |
| Operation | **III** | W | W | M | M | **M/W** | | **Yes with Mit.** | |
| Closure | **III** | W | W | W | W | **W** | No change as siding is not linked to closure of the mine | **Yes** | NA |

*(Key: N = None, W = Weak, M = Moderate, S = Strong, Mit = Mitigation)*

## 7.4 Panbult Siding Site Photographs and Contrast Rating table

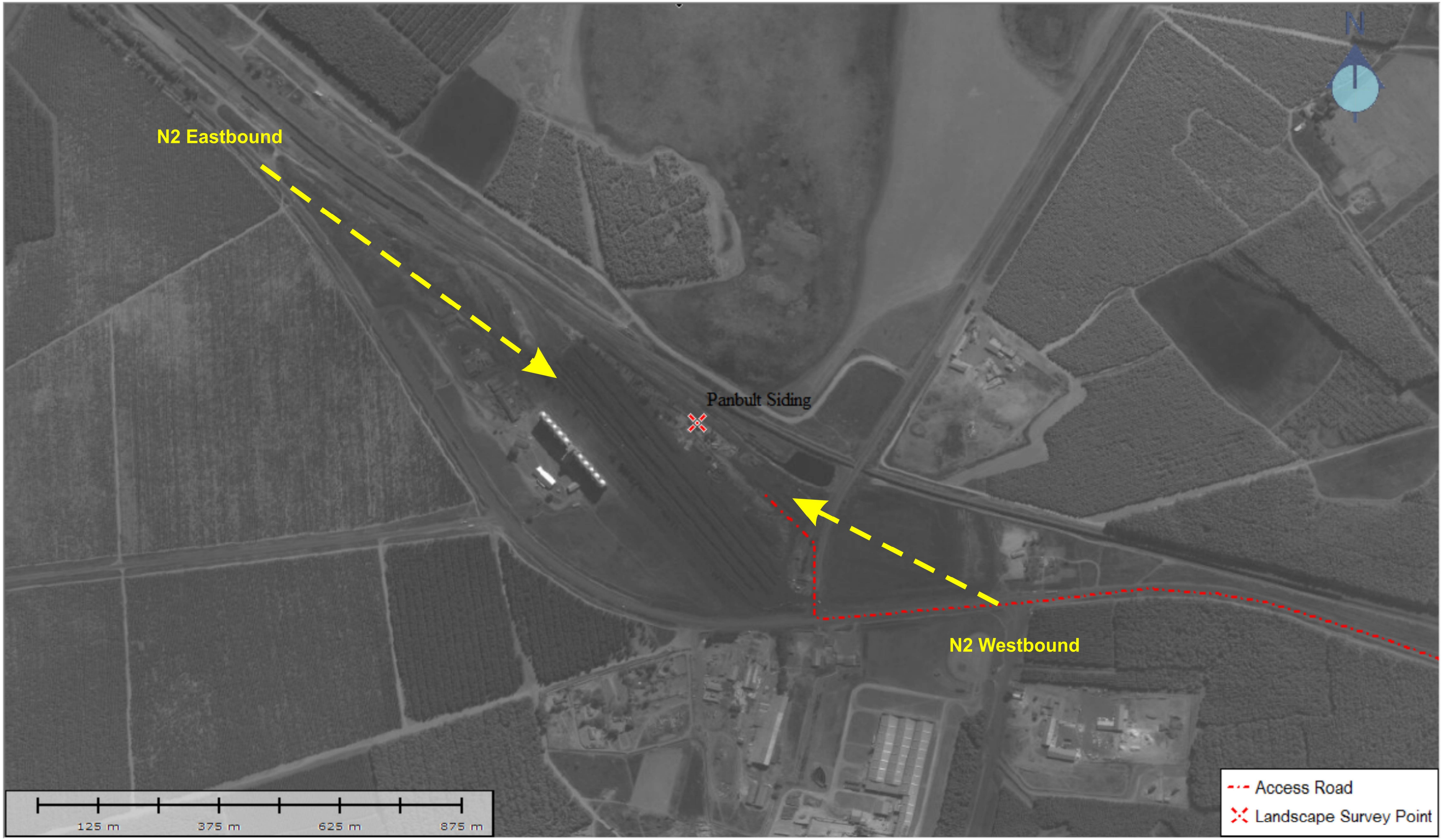



Figure 41:Panbult Siding Receptor View Point Locality overlay onto Satellite Image Map

***<u>Panbult Siding Site Key Observation Points</u>***

For the Panbult Siding site, the following receptors were identified as falling within the viewshed and making use of the visual resources located where the proposed activities would be located. This area is classed as Class IV which allows for large-scale modifications. No photomontage was therefore necessary from this KOP.

Figure 42:Photograph from R11 towards existing Panbult siding located behind bridge to right of silo.

Figure 43:Photograph of view from N2

Table 20: Panbult Siding Contrast Rating Table

| KOP: N2 | | | | | | | Project: YZERMYN COAL MINE | | Component: PANBULT SIDING |
|---|---|---|---|---|---|---|---|---|---|
| **Impact Description** | **Class** | **Form** | **Line** | **Colour** | **Texture** | **DoC** | **Degree of Contrast Motivation** | **Objective Met?** | **Mitigation** |
| Construction | IV | M/W | W | M | M | **M/W** | The dark colour of the coal will be dominant in the generally mid-toned and light view. Movement and reflections generated by the haulage trucks, as well as dust, will generate *moderate* levels of contrast. Form will be *low* to the ground and will not break the horizon. | **Yes with Mit.** | Coal dust and movement of trucks is controlled. All access roads must be tarred and a row of screening trees planted alongside the road. |
| Operation | IV | W | W | M | M | **M/W** | | **Yes with Mit.** | |
| Closure | IV | W | W | W | W | **W** | No change as siding is not linked to closure of the mine | **Yes** | Not applicable |

*(Key: N = None, W = Weak, M = Moderate, S = Strong, Mit = Mitigation)*

# 8 IMPACT ASSESSMENT

The Environmental Impact Rating was undertaken according to the criteria provided by WSP to determine the significance of the potential impact as a result of the proposed project. These rating criteria are further explained in *Annexure 4: Methodology.*

## 8.1 WSP Risk Assessment Methodology

The potential environmental impacts will be evaluated according to their severity, duration, extent and the significance of the impact. Furthermore, cumulative impacts will also be taken into consideration. WSP's risk assessment methodology will be used for the ranking of the impacts.

This system derives environmental significance on the basis of the consequence of the impact on the environment and the likelihood of the impact occurring. Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact. Likelihood considers the frequency of the activity together with the probability of an environmental impact occurring.

The following tables *(Table 1 to Table 8)* describe the process in detail:

**Table 1: Assessment and Rating Sensitivity**

| Rating | Description |
|---|---|
| 1 | Negligible/ non-harmful/ minimal deterioration (0 – 20%) |
| 2 | Minor/ potentially harmful/ measurable deterioration (20 – 40%) |
| 3 | Moderate/ harmful/ moderate deterioration (40 – 60%) |
| 4 | Significant/ very harmful/ substantial deterioration (60 – 80%) |
| 5 | Irreversible/ permanent/ death (80 – 100%) |

**Table 2: Assessment and Rating of Duration**

| Rating | Description |
|---|---|
| 1 | Less than 1 month/ quickly reversible |
| 2 | Less than 1 year/ quickly reversible |
| 3 | More than 1 year/ reversible over time |
| 4 | More than 10 years/ reversible over time/ life of project or facility |
| 5 | Beyond life of project of facility/ permanent |

**Table 3: Assessment and Rating of Extent**

| Rating | Description |
|---|---|
| 1 | Within immediate area of activity |
| 2 | Surrounding area within project boundary |
| 3 | Beyond project boundary |
| 4 | Regional/ provincial |
| 5 | National/ international |

Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact.

**Table 4: Determination of Consequence**

| Determination of Consequence (C) | (Severity + Duration + Extent) / 3 |
|---|---|

**Table 5: Assessment and Rating of Frequency**

| Rating | Description |
|---|---|
| 1 | Less than once a year |
| 2 | Once in a year |
| 3 | Quarterly |
| 4 | Weekly |
| 5 | Daily |

**Table 6: Assessment and Rating of Probability**

| Rating | Description |
|---|---|
| 1 | Almost impossible |
| 2 | Unlikely |
| 3 | Probable |
| 4 | Highly likely |
| 5 | Definite |

Likelihood considers the frequency of the activity together with the probability of the environmental impact associated with that activity occurring.

**Table 7: Determination of Likelihood**

| Determination of Likelihood (L) = | (Frequency + Probability) / 2 |
|---|---|

- Impact Significance

Impact significance is the product of the consequence and likelihood values.

**Table 8: Determination of Environmental Significance**

| Environmental Significance (Impact) = C × L | Description |
|---|---|
| L (1 – 4.9) | Low environmental significance |
| LM (5 – 9.9) | Low to medium environmental significance |
| M (10 – 14.99) | Medium environmental significance |
| MH (15 – 19.9) | Medium to high environmental significance |
| H (20 – 25) | High environmental significance. Likely to be a fatal flaw. |

WSP Impacts Rating Methodology

2

Table 5: Impact Summary Table

| | | | | | A | B | C | D | E | F | G | (DxG) | (DxG) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref. | Impact | Phase | Impact Description | Mitigation Measure | Severity | Duration | Extent | Consequence (A+B+C)/3 | Frequency | Probability | Likelihood (E+F)/2 | Environmental Significance (Without Mitigation) | Environmental Significance (With Mitigation) |
| 1.1 | Mine plant, conveyors and stockpiles, workshop and isolated smaller structures | Construction | Visual intrusion from cut and fill earthworks, plant structures with discordant colours. Lights at night. Movement of construction vehicles. Changes to site and the surrounding area's visual sense of place. | Light emission mitigation (Refer to Annexure 5). Level using cut rather than fill method with stockpiling of topsoil to be used in construction phase rehabilitation from footprint site. Dust suppression on footprint area. Colour mitigation for structure walls painted earth tones with a grey hue and roof colour slate grey (same colour theme for all structures unless required otherwise for safety warning). Plants, pipes, conveyors and accessory works infrastructure to be painted mid-grey unless required otherwise for safety warning. Retaining walls to be brown in colour. Earth berm of 1.5m height to be created on northern, eastern and western raised fill areas to screen off vehicles and base views from proximate rural receptors located below the site. Soil erosion prevention management on fill slopes, rehabilitated and restored to veld grass. | 3.0 | 4.0 | 3.0 | 3.3 | 5.0 | 4.0 | 4.5 | 15.0 | |
| | | | | | 2.0 | 4.0 | 2.0 | 2.7 | 5.0 | 3.0 | 4.0 | | 10.7 |
| | | Operation | Visual intrusion from black colours of the stockpiles, lights at night and pollution. Movement of loading trucks and vehicles. | Light emission mitigation *(Refer to Annexure 5).*Continued rehabilitation and restoration of fill slopes to veld grasses. Litter management with littering being a punishable offence. | 3.0 | 4.0 | 3.0 | 3.3 | 5.0 | 3.0 | 4.0 | 13.3 | |
| | | | | | 2.0 | 4.0 | 2.0 | 2.7 | 5.0 | 2.0 | 3.5 | | 9.3 |
| | | Closure | Movement of construction vehicles and lights at night. Removal of structures and processing plant. Dust during deconstruction phase. | Removal of all structures and hard surface road materials. Ripping of all compacted surfaces. Reshaping of footprint area to allow for hydrological run-off. Windblown dust suppression. Rehabilitation and restoration of transformed footprints area to veld grasses. | 3.0 | 4.0 | 3.0 | 3.3 | 5.0 | 3.0 | 4.0 | 13.3 | |
| | | | | | 1.0 | 2.0 | 1.0 | 1.3 | 5.0 | 2.0 | 3.5 | | 4.7 |

| Ref. | Impact | Phase | Impact Description | Mitigation Measure | Severity | Duration | Extent | Consequence (A+B+C)/3 | Frequency | Probability | Likelihood (E+F)/2 | Environmental Significance (Without Mitigation) | Environmental Significance (With Mitigation) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.2 | Office Block and parking | Construction | Visual intrusion from cut and fill earthworks, plant structures with discordant colours. Lights at night. Movement of construction vehicles. Changes to site and surrounding areas visual sense of place. | Light emission mitigation *(Refer to Annexure 5)*.Level by cut rather than fill method with stockpiling of topsoil from footprint site to be used in construction phase rehabilitation. Dust suppression on footprint area. Retaining walls to be brown in colour. Earth berm of 1.5m height to be created on northern, eastern and western raised fill areas to screen off vehicles and base views from proximate rural receptors located below the site. Soil erosion prevention management on fill slopes, rehabilitated and restored to veld grass. Colour mitigation with structure walls painted mid-tone earth hue and roof colour slate grey (same colour theme for all structures). Utilisation of darker green or brown coloured shade cloth material for vehicle shading. If no shading structures planned, incorporate shading trees into parking design*(such as Ziziphus mncronata, Quercus ilex, Olea Africana, Acacia Karoo, Schinus mole or Cyressus sempervirens var. stricta)*.Incorporation of indigenous trees into the landscaping to break up the long north facing wall facade. | 3.0 | 4.0 | 3.0 | 3.3 | 5.0 | 4.0 | 4.5 | 15.0 | |
| | | | | | 2.0 | 4.0 | 2.0 | 2.7 | 5.0 | 3.0 | 4.0 | | 10.7 |
| | | Operation | Visual intrusion from discordant colour reflections, sunlight glint from parking vehicles and lights at night. Movement of trucks and vehicles. | Light emission mitigation (refer to generic sheet in appendix). Continued rehabilitation and restoration of fill slopes and low screening berm to veld grasses. Litter management with littering being a punishable offence. | 3.0 | 4.0 | 3.0 | 3.3 | 5.0 | 3.0 | 4.0 | 13.3 | |
| | | | | | 2.0 | 4.0 | 2.0 | 2.7 | 5.0 | 2.0 | 3.5 | | 9.3 |
| | | Closure | Movement of construction vehicles and lights at night. Removal of structures and the plant. Dust during deconstruction phase. | Removal of all structures and hard surface road materials. Ripping of all compacted surfaces. Reshaping of footprint area to allow for hydrological run-off. Windblown dust suppression. Rehabilitation and restoration of transformed footprints area to veld grasses. | 3.0 | 4.0 | 3.0 | 3.3 | 5.0 | 3.0 | 4.0 | 13.3 | |
| | | | | | 1.0 | 2.0 | 1.0 | 1.3 | 5.0 | 2.0 | 3.5 | | 4.7 |

| Ref. | Impact | Phase | Impact Description | Mitigation Measure | Severity | Duration | Extent | Consequence (A+B+C)/3 | Frequency | Probability | Likelihood (E+F)/2 | Environmental Significance (Without Mitigation) | Environmental Significance (With Mitigation) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.3 | Tunnel Head | Construction | Visual intrusion from blasting and cutting of mine tunnel. Colour contrast from concrete supporting structures. | Removal of topsoil and add to topsoil stockpile to be used in construction phase rehabilitation. Provide adequate warning to neighbouring farmers regarding blasting times. Retain rough concrete surfaces and do not paint retaining walls bright colours (unless required for safety) | 3.0 | 5.0 | 3.0 | 3.7 | 5.0 | 4.0 | 4.5 | 16.5 | |
| | | | | | 2.0 | 5.0 | 2.0 | 3.0 | 5.0 | 3.0 | 4.0 | | 12.0 |
| | | Operation | Visual intrusion of tunnel head support structure. Windblown dust from transport of coal and discard. | Dust suppression management. Tunnel head will darken naturally from coal dust | 3.0 | 5.0 | 3.0 | 3.7 | 5.0 | 4.0 | 4.5 | 16.5 | |
| | | | | | 2.0 | 5.0 | 2.0 | 3.0 | 5.0 | 3.0 | 4.0 | | 12.0 |
| | | Closure | Visual intrusion of tunnel head support structures. Continued utilisation by illegal mining | Closure of tunnel head which allows for safety access but would restrict illegal mining activities. Fence off tunnel head area. | 4.0 | 5.0 | 3.0 | 4.0 | 5.0 | 5.0 | 5.0 | 20.0 | |
| | | | | | 2.0 | 5.0 | 2.0 | 3.0 | 5.0 | 3.0 | 4.0 | | 12.0 |
| 1.4 | Bus parking earth-works | Construction | High levels of visual intrusion generated by cut and fill on steep sloping ground. | Relocation of bus parking and turning area to lower ground that is not as steep in gradient. Retaining walls to be brown in colour. Rehabilitation and restoration of fill slopes to veld grasses. Structures to follow colour theme. Incorporate shade trees on the north and eastern sides of the parking area to screen off views of parked busses from surrounding areas (refer to landscape tree list). | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | 5.0 | 5.0 | 15.0 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 2.0 | 3.5 | | 8.2 |
| | | Operation | Visual intrusion from discordant colour reflections, sunlight glint from parking vehicles and lights at night. Movement of trucks and vehicles. | Light emission mitigation *(Refer to Annexure 5)*.Continued rehabilitation and restoration of fill slopes and low screening berm to veld grasses. Continued maintenance of screening trees. Litter management with littering being a punishable offence. | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | 5.0 | 5.0 | 15.0 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 2.0 | 3.5 | | 8.2 |
| | | Closure | Movement of construction vehicles and lights at night. Removal of structures and the plant. Dust during deconstruction phase. | Removal of all structures and hard surface road materials. Ripping of all compacted surfaces. Reshaping of footprint area to allow for hydrological run-off. Windblown dust suppression. Rehabilitation and restoration of transformed footprints area to veld grasses. | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | 5.0 | 5.0 | 15.0 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 2.0 | 3.5 | | 8.2 |

| Ref. | Impact | Phase | Impact Description | Mitigation Measure | Severity | Duration | Extent | Consequence (A+B+C)/3 | Frequency | Probability | Likelihood (E+F)/2 | Environmental Significance (Without Mitigation) | Environmental Significance (With Mitigation) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.5 | Pollution Control Dam Visual Intrusion | Construc -tion | Visual intrusion from earthworks and dam wall. | Soil erosion prevention. Rehabilitation and restoration of dam walls to veld grasses. | 2.0 | 2.0 | 2.0 | 2.0 | 5.0 | 2.0 | 3.5 | 7.0 | |
| | | | | | 1.0 | 2.0 | 1.0 | 1.3 | 5.0 | 2.0 | 3.5 | | 4.7 |
| | | Opera -tion | Pollution of surrounding streams if dams overflow | Dam level monitoring and dam wall maintenance | 4.0 | 2.0 | 2.0 | 2.7 | 5.0 | 2.0 | 3.5 | 9.3 | |
| | | | | | 1.0 | 2.0 | 1.0 | 1.3 | 5.0 | 2.0 | 3.5 | | 4.7 |
| | | Closure | Pollution of surrounding streams if dams overflow or break, or are not removed. | Removal of any contaminated earth. Deconstruction and filling of the dam. Shaping to allow for nature run-off. Rehabilitation and restoration of transformed footprints area to veld grasses. | 4.0 | 2.0 | 2.0 | 2.7 | 5.0 | 4.0 | 4.5 | 12.0 | |
| | | | | | 1.0 | 2.0 | 1.0 | 1.3 | 5.0 | 2.0 | 3.5 | | 4.7 |
| 1.6 | Discard Dump Visual Intrusion | Construction | Earthworks and associated dust for removal of topsoil. | Amend design of dump to allow for benching on north, east and western dump slopes to facilitate operation phase vehicle access for the application of topsoil for rehabilitation of dump faces. Incorporate management plan which would allow for a phased expansion of the discard dump where topsoil from the expansion area is utilised directly on the rehabilitation of the previous dump face. This would allow for topsoil not to be sterilised by stockpiling. Dust control measures during earthworks. Creation of 2 - 5 metre retaining wall to support toe of dump on north, east and west dumps slopes to prevent erosion and slipping on discard slopes. Rehabilitation and restoration of support berm to veld grasses. Plant row of screening trees*(see tree recommendations in 1.2 above)*along north, east and western toe of dump. (See Figure 44: Mitigation:Discard Dump Concept Shaping and Screening Tree Location Map (NTS) | 3.0 | 2.0 | 2.0 | 2.3 | 5.0 | 4.0 | 4.5 | 10.5 | |
| | | | | | 2.0 | 2.0 | 2.0 | 2.0 | 5.0 | 3.0 | 4.0 | | 8.0 |
| | | Operation | Visual intrusion from strong colour, form and texture change from the establishment of discard dump. Windblown dust. | Continue dust control measures on dump surface. Using bench access roads continue application of topsoil onto dump sites and rehabilitation to veld grass. Maintenance of screening tree growth. | 4.0 | 5.0 | 4.0 | 4.3 | 5.0 | 5.0 | 5.0 | 21.7 | |
| | | | | | 3.0 | 5.0 | 3.0 | 3.7 | 5.0 | 3.0 | 4.0 | | 14.7 |
| | | Closure | Visual intrusion from strong colour, form and texture change from the establishment of discard dump. Windblown dust. | Cover dump surface with topsoil, rehabilitate and restore to veld grasses. | 4.0 | 5.0 | 4.0 | 4.3 | 5.0 | 5.0 | 5.0 | 21.7 | |
| | | | | | 3.0 | 5.0 | 3.0 | 3.7 | 5.0 | 3.0 | 4.0 | | 14.7 |

| Ref. | Impact | Phase | Impact Description | Mitigation Measure | Severity | Duration | Extent | Consequence (A+B+C)/3 | Frequency | Probability | Likelihood (E+F)/2 | Environmental Significance (Without Mitigation) | Environmental Significance (With Mitigation) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.7 | Access Roads Dust | Construction | High levels of visual intrusion from dust from earthworks and moving vehicles. Soil erosion along drainage lines. | Dust suppression management. Drainage management and rehabilitation. Tarring of road from Dirkiesdorp to mine entrance to reduce vehicle dust. Dust control on mine site to limit windblown dust from moving vehicles. | 4.0 | 3.0 | 3.0 | 3.3 | 5.0 | 5.0 | 5.0 | 16.7 | |
| | | | | | 1.0 | 3.0 | 1.0 | 1.7 | 5.0 | 1.0 | 3.0 | | 5.0 |
| | | Operation | High levels of visual intrusion from dust from moving coal trucks. Soil erosion on drainage lines. | Maintenance of tarred road from Dirkiesdorp to mine entrance. Management of trucks. | 4.0 | 4.0 | 3.0 | 3.7 | 5.0 | 5.0 | 5.0 | 18.3 | |
| | | | | | 1.0 | 3.0 | 1.0 | 1.7 | 5.0 | 1.0 | 3.0 | | 5.0 |
| | | Closure | Not applicable as the tarred road would become a permanent feature serviced by the municipality. | NA | | | | | | | | | |
| | | | | | | | | | | | | | |
| 1.8 | Site Access Roads | Construction | Dust from the earthworks. Clearing of the vegetation to create the road. Earthworks, earthworks dust and dust from moving vehicles. | Dust suppression management. Tar the access road for the trucks to the loading area. Drainage management and rehabilitation. | 3.0 | 3.0 | 2.0 | 2.7 | 5.0 | 5.0 | 5.0 | 13.3 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 3.0 | 4.0 | | 9.3 |
| | | Operation | Black coal dust from moving vehicles. | Drainage management and continued rehabilitation of modified areas. | 3.0 | 3.0 | 2.0 | 2.7 | 5.0 | 5.0 | 5.0 | 13.3 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 3.0 | 4.0 | | 9.3 |
| | | Closure | Visual scarring from disused access roads | Removal of all hard surface road materials. Ripping of all compacted surfaces on the mine site. Reshaping of footprint area to allow for hydrological run-off. Windblown dust suppression. Rehabilitation and restoration of transformed footprints area to veld grasses. | 4.0 | 5.0 | 3.0 | 4.0 | 5.0 | 4.0 | 4.5 | 18.0 | |
| | | | | | 1.0 | 3.0 | 1.0 | 1.7 | 5.0 | 1.0 | 3.0 | | 5.0 |

| Ref. | Impact | Phase | Impact Description | Mitigation Measure | Severity | Duration | Extent | Consequence (A+B+C)/3 | Frequency | Probability | Likelihood (E+F)/2 | Environmental Significance (Without Mitigation) | Environmental Significance (With Mitigation) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.9 | Piet Retief Siding | Construction | Expansion of the existing Piet Retief Siding | If mine would result in a significant increase in volumes of coal deposited at the siding, tarring of the access road from the R33 (N2) to the entrance to the siding is recommended to reduce windblown dust from transport trucks. Expansion of the existing tree line along the railway line to increase tree screening as seen from Piet Retief residential receptors. | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | 3.0 | 4.0 | 12.0 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 2.0 | 3.5 | | 8.2 |
| | | Operation | Utilisation of the existing Piet Retief Siding | Continued maintenance of screening trees. | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | 3.0 | 4.0 | 12.0 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 2.0 | 3.5 | | 8.2 |
| | | Closure | Not applicable as siding continuation is not related to mine closure | NA | | | | | | | | | |
| | | | | | | | | | | | | | |
| 2 | Panbult Siding | Construction | Not applicable as the siding is located in an industrial node with no residential receptors. The site is already highly modified and the expansion would not result in a visible change to the landscape character. | NA | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | Operation | As above | NA | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | Closure | As above | NA | | | | | | | | | |
| | | | | | | | | | | | | | |

| Ref. | Impact | Phase | Impact Description | Mitigation Measure | Severity | Duration | Extent | Consequence (A+B+C)/3 | Frequency | Probability | Likelihood (E+F)/2 | Environmental Significance (Without Mitigation) | Environmental Significance (With Mitigation) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.1 | Cumulative effects of mine setting a precedent for other coal mining in the area, as well as the expansion of mine to mountainous areas within the MLA to the south-west | All | Cumulative visual impact from expansion of the mine to the western areas of the Mine Licence Area. Represented without mitigation only as expansion of the mine to the mountainous areas to the south-west would result in significant loss of visual resources which have potential to be included in the larger conservancy area. | Wakkerstroom birding and biodiversity is an international tourist destination and is strongly reliant on preservation of the current visual resources of the town and the surrounding areas. Any decision regarding further expansion of this coal mine should be subject to the relevant authority implementing a Strategic Environmental Assessment (SEA) to determine the thresholds of the Wakkerstroom biodiversity. Any change to the mine plan should be subject to a separate VIA. | 4.0 | 5.0 | 5.0 | 4.7 | 5.0 | 5.0 | 5.0 | 21.7 | |
| | | | | | | | | | | | | | |
| 2.2 | Unforeseen and sudden closure due to changes in coal regulation | All | Cumulative visual intrusion from landscape decay caused by unforeseen and sudden closure | At commencement of mining, implement working closure plan and secure funds for closure. Update closure plan every 5 years. | 4.0 | 5.0 | 4.0 | 4.3 | 5.0 | 4.0 | 4.5 | 19.5 | |
| | | | | | 2.0 | 3.0 | 2.0 | 2.3 | 5.0 | 2.0 | 3.5 | | 8.2 |

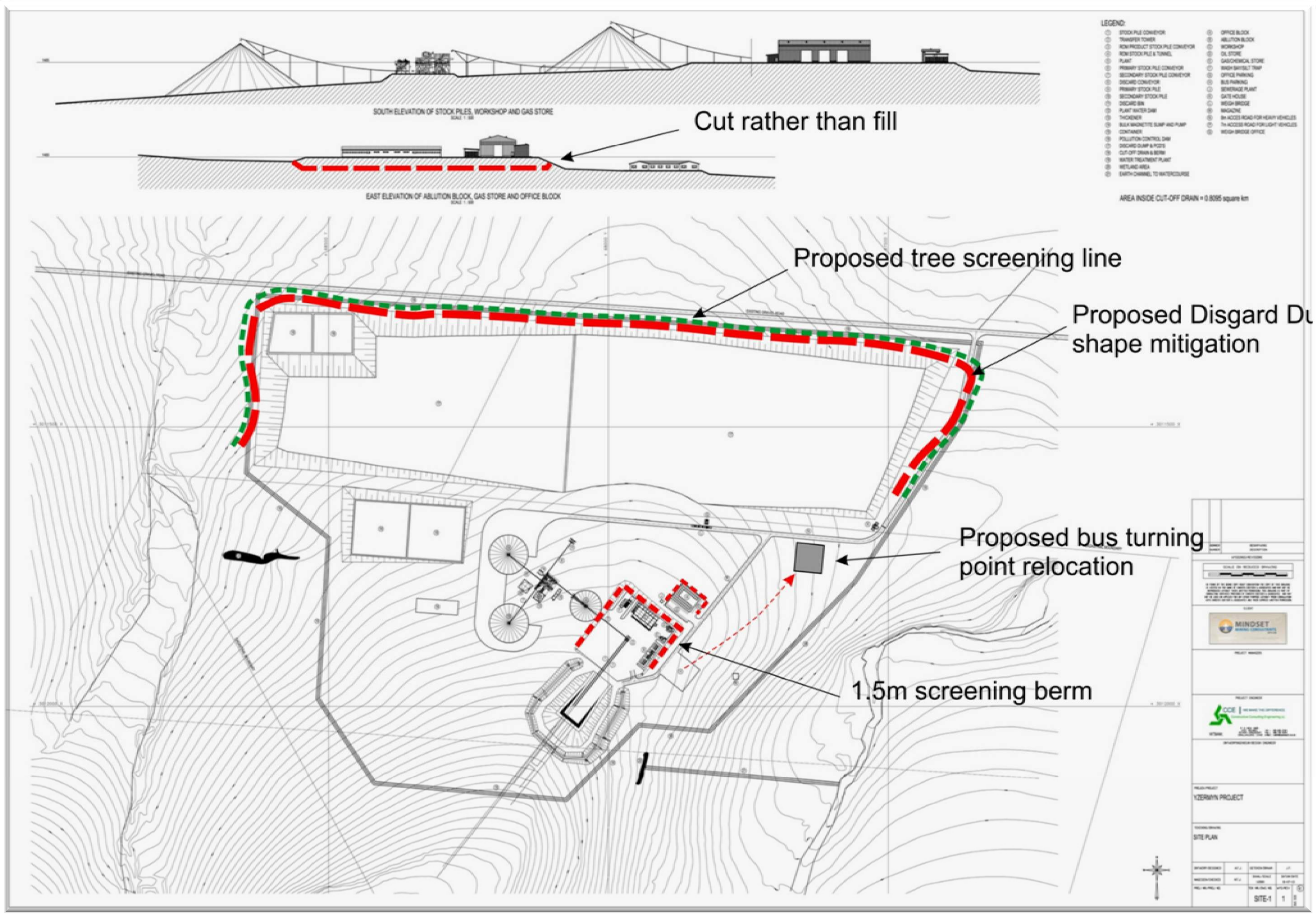



Figure 44: Mitigation:Discard Dump Concept Shaping and Screening Tree Location Map (NTS)

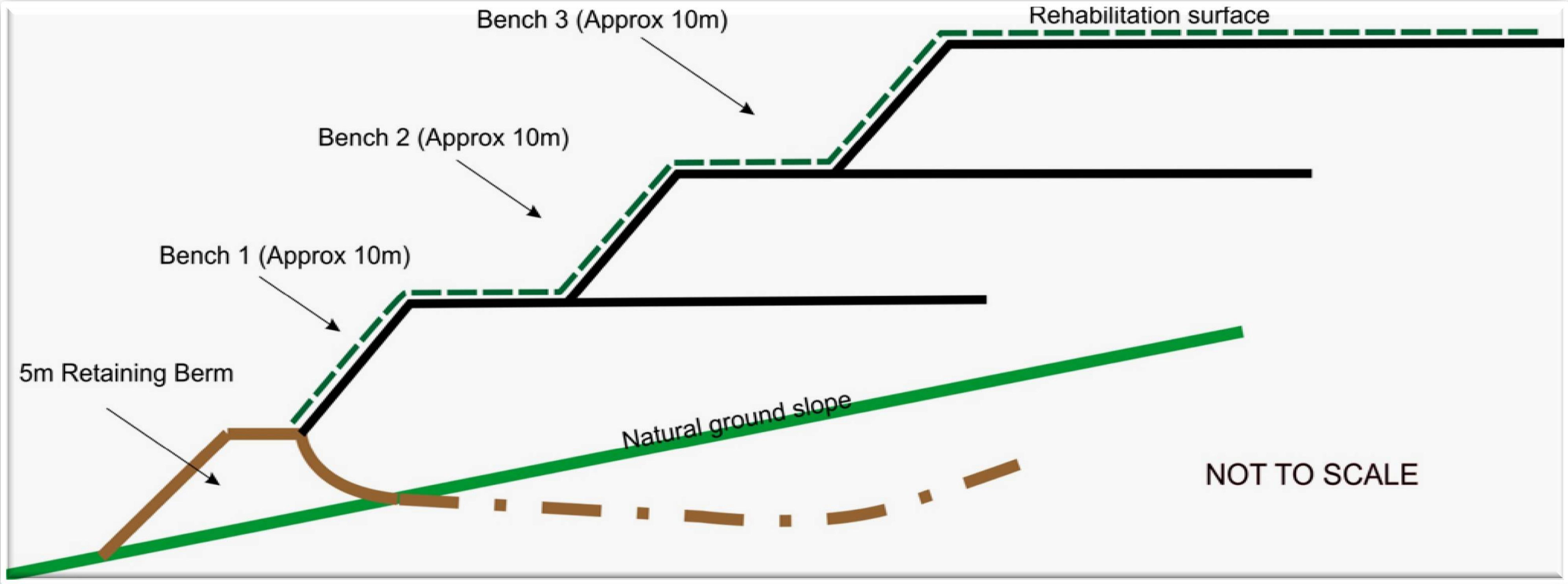



Figure 45: Mitigation: Discard Dump Concept Bench Profile Drawing (NTS)

# 9 IMPACT FINDINGS

## 9.1 Severity

The severity of the impact is defined as the degree of deterioration to the surroundings *(Oberholzer, B. 2005).*

The overall severity of the proposed mining activities assessed ranges from **negative significant** (without mitigation), and **negative moderate to high** should mitigation be implemented. The key factors influencing the severity of the proposed landscape modification are the large size, scale and colour of the discard dump and the black colour of the plant facilities and the conical shape of the stockpiles. These are alien to the surrounding rural agricultural landscape which currently has no mining precedent. Some aspects of the proposed mining activities, would not be able to be mitigated (such as the stockpiles). However, certain mitigations have been recommended which include design changes to the discard dump. These will allow for continuous rehabilitation of the side walls which would reduce the extent of the visual intrusion.

The location of the mine site at a lower elevation (as opposed to the original scoping site at a higher elevation) has reduced the extent of the visibility to the surrounding areas. This is due to localised topographic screening provided by adjacent raised hilly ground to the south and west, which directs the mine viewsheds mainly north and eastward. The north facing slopes of the hills to the south and west will have high exposure, but currently are not associated with any receptors. The viewshed to the east does overlap with the proclaimed conservancy area, but at a distance of 12 kilometres where receptors would have low levels of visual exposure. The Zone of Visual Influence (ZVI) from the proposed mine activities indicates that mainly northern receptors within the 6 km range will be affected by the change in landscape character. These northern areas have a moderate scenic quality and landscapes that are fragmented by undulating terrain and sporadic clumps of alien vegetation. These include Black Ironwood (*Acacia melanoxylon),* located within the kloof and headwaters of the river systems as well as along the river to the east, Wattle trees (Acacia mearnsii), Red River Gum *(Eucalyptus camaldulensis Dehnh).* The majority of alien species are weedy species (*Natural Scientific Services. 2013).*Landuse in this northern area is mainly related to low intensity agriculture with no tourism activities identified in this area.

Receptor sensitivity ranges from extreme concern from environmental groups and tourist operators, to positive perceptions from local community groups who are seeking potential employment. The environmental group's concerns stem from the proximity of the mine to the important biodiversity, scenic landscapes and eco-tourism activities associated around the town of Wakkerstroom located 23 km to the south. They are concerned that authorisation of this mine could set a precedent for mining in the area which could degrade the landscapes and biodiversity resource base which supports tourism and biodiversity in the area.

The severity of the visual impact generated by construction vehicles and coal transport trucks ranges from **negative significant** (without mitigation), to **negative moderate to low** (with mitigation). The main visual issue associated with the access route via Dirkiesdorp is the dust generated by the transport trucks and movement of the trucks through the town. The dust has the potential to result in a significant visual impact and discomfort to those residential and educational receptors located adjacent to the road. Mitigation would include tarring the existing gravel road from the proposed mine site to Dirkiesdorp which would reduce the visual intrusion of the dust. It is also recommended that traffic calming measures are implemented for trucks passing through the Dirkiesdorp town, for safety as well as for visual and noise reasons.

The severity of the visual impact of the proposed coal sidings is **negative moderate** for Piet Retief (without mitigation) and **negative minor** (with mitigation). The Piet Retief (Jindal) coal siding is already well established, and has *moderate* exposure levels to residential receptors. The change in landscape character will only be noticeable should there be a significant increase in volume of coal handling. Should this be the case, proposed mitigation measures would include increasing the existing local tree screening, and implementing dust mitigation on the short gravel access route to the site. The Panbult siding is highly modified and a large increase in volume of coal transported to the site would not result in a significant change to the landscape character. As such the site was not assessed further as severity would be **negligible**, with and without mitigation.

## 9.2 Duration

The duration of the impact is defined as the predicted life-span of the visual impact *(Oberholzer, B. 2005).*

The proposed construction phase of the mine would take place over a 2 year time period and life of mine was assumed to be long term as no definitive time for actual closure was defined *(Atha Group. 2013).*The duration of the mine activities' visual impact will range from **permanent** (without mitigation) to **reversible over time** (with mitigation). Due to the size and scale of the proposed landscape modifications, the duration impacts would follow the time frames of the core mining phases (construction, operation and closure).

The duration of the visual impact relating to the use of the access road ranges from **life of project** (without mitigation) to **quickly reversible** (with mitigation). The core visual issue that would require mitigation is the generation of dust along the existing gravel road between the proposed mine site and the town of Dirkiesdorp. Without mitigation the duration of the impact would continue for the life of the mine. With mitigation including the tarring of the gravel road, the dust of the movement of trucks would be contained to the construction phase.

The duration of the visual impact of the two siding options are **moderate** (with and without mitigation) as they are currently active and would continue with or without the proposed mine.

## 9.3 Extent

The extent of the impact is defined as the spatial or geographic area of influence of the visual impact *(Oberholzer, B. 2005).*

The visual intensity of the proposed mine will be strong as experienced by receptors located in the foreground / mid ground areas surrounding the mine. However, the visual intrusion of the proposed phase 1 (above ground) mine will be reduced fairly quickly with increased distance due to hilly terrain to the south, and undulating terrain and pockets of alien vegetation located to the north. It must be noted that the expansion into the proposed greater Mine License Area would take the mining activities and associated high visual impacts into the hilly landscapes to the north of Wakkerstroom, which have high scenic qualities associated with steep sided valleys, and which are closer to the Wakkerstroom landscape context.

Within the high exposure areas, the Class III visual objective of maintaining the existing rural agricultural landscape will not be met during the life of mine. This is due to a *strong* degree of contrast generated by the discard dump, plant and workshops activities. Recommendations for mitigation to meet the Class III visual objectives (moderate landscape change) have been made and these would help to contain the extent of the visual impact. The main issue would be the design of the discard dump which should be benched to allow for continuous rehabilitation of the slope faces. Should these recommendations be accepted and implemented, the extent of the visual intrusion could be reduced to *moderate to high* with the continuous rehabilitation of the discard dump. However, due to there being no precedent for mining or industry in the area, the extent or Zone of Visual Influence (ZVI) for the mine was defined as **regional** (with and without mitigation).

The extent of the visual impact of the trucks was defined as **beyond project boundary** (without mitigation) and **within immediate area of activity** (with mitigation) which would include tarring of the road from the mine to the R543 to reduce dust generated from coal trucks.

As both sidings are already established, the extent of the visual impact was defined as **within immediate area of activity**.

## 9.4 Frequency

The frequency of the impact is defined as the time scale of the impact.

The mine site is located adjacent to a rural district road and is utilised by farmers on a daily basis to access farms. There are few farm labourer residential receptors located in close proximity to the site. The frequency of the visual impact to receptors in the area was defined as occurring on a **daily basis**.

The proposed access route for coal carrying trucks is routed through Dirkiesdorp and past the Sinethemba Agricultural School. The movement of construction vehicles and coal trucks during operation phase will take place on a **daily basis**.

The visual impact of the two proposed sidings already takes place on a daily basis as Piet Retief residential receptors are located in clear view of the Piet Retief railway siding, and the N2 receptors are subject to **daily** visual exposure to the existing Panbult Siding.

## 9.5 Probability

Probability of the impact is defined as the degree of possibility of the visual impact occurring.

The probability of the mine visual impact occurring will range from **definite** (without mitigation) to **highly likely**(with mitigation). Due to the size and scale of the discard dump and the industrial nature of the plant and stockpiles, the visual impact will definitely be perceived. This is due to the existing rural agricultural setting and the location of the mine on the foot of the hills to the south. In the area, cultural modifications are limited and are agricultural in nature. With mitigation of the discard dump, the probability of the visual impact is still highly likely, but can be reduced to probable in closure, with dump rehabilitation, the removal of the post mine structures and associated rehabilitation and restoration of impact footprints.

The probability of the road visual impact occurring relates to dust management. The proposed route is an existing gravel road. There is a precedent already set for vehicle movement on the road causing some dust, but at low frequencies. However, dust visual impact would definitely cause a negative impact on the adjacent residential and educational receptors. The tarring of the gravel road from the mine site to Dirkiesdorp and the implementation of associated traffic calming to reduce vehicle speeds along the tarred road, will reduce the probability of the dust visual impact.

The probability of the visual impact of the siding areas is defined as **probable** (without mitigation) and **unlikely** (with mitigation). This impact would only occur if the size of the siding significantly increased. As other mines are also using (and will continue to use) the existing coal sidings, the probability ratings are assumptions only.

## 9.6 Cumulative impacts

Two visual issues relating to cumulative impacts were identified: the effects of this mine, (including mine expansion degrading scenic resources and setting a precedent for other coal mining in the area), and unforeseen and sudden closure due to changes in global or national legislation associated with global warming and reducing $CO^2$ emissions. Although this proposed mine site is more associated with the lower lying, gently undulating lands of the rural agricultural landscape to the north, expansion of the mine into the Mine License Area extends into a larger area to the south-east. This hilly area has high scenic qualities, and has potential for conservation and tourism due to the combination of intact visual resources and closer proximity to the existing tourist node of Wakkerstroom. The proposed mine expansion would set a precedent for other mines entering the more visually and biodiversity significant areas to the south. This would result in a significant loss of visual resources in the area and to the region.

Wakkerstroom is an international birding attraction and tourist destination, and is strongly reliant on preservation of the current visual resources of the town and the surrounding areas. The cumulative impact of expansion of the mine is to the southern hills, and the precedent for further mining being set in the area, is defined as having a **high** cumulative visual significance as this would result in a major decrease of visual resources of the area. To mitigate this potential cumulative visual impact, should the proposed mine site receive authorisation, further expansion of the mine into the southern MLA should be subject to a Strategic Environmental Assessment (SEA). The SEA would need to assess the resilience and thresholds related to the greater Wakkerstroom area biodiversity and eco-tourism in order to make an informed regional decision on the suitability of mining around Wakkerstroom.

The second cumulative impact of sudden closure associated with changes to legislation is rated as having a lower probability, but could still result in **moderate to high** visual significance due to landscape sterilisation of surrounding areas due to possible illegal mining activities. This cumulative effect can be contained by ensuring that mitigation of the dump is undertaken continuously and that a mine closure plan is drawn up as soon as the proposed mine begins to operate. This closure plan must define the steps and costs associated with complete rehabilitation and restoration. A trust fund needs to be set up to fund the mine closure and a closure plan will need to be reviewed and updated every five years.

### 9.7 Visual Impact Significance

Environmental significance is the product of the consequence and likelihood values. Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact. Likelihood considers the frequency of the activity together with the probability of the environmental impact associated with that activity occurring. *(WSP criteria)*

The visual impact significance of the mining activities ranged from **negative high** (without mitigation and Not Recommended) to **negative medium to high** (with mitigation). The significance of the tunnel head relates to post closure phase should the closure mitigations not be properly implemented, allowing for illegal mining operations. This activity would result in the mining remaining in 'operation' without management control. The criminal element associated with illegal mining would degrade the perception of safety in the surrounding agricultural areas.

Without mitigation the discard dump would result in **negative high** significance due to the size and scale of this landscape modification in a rural landscape. Given the close proximity of the proposed mine site to the important hilly landscapes to the south, which have eco-tourism and conservation potential, the recommendation of this assessment is that visual impact significance for the mine should be defined as **negative high** due to the cumulative risks of the proposed mine setting a precedent for other mining in the area, and that the expansion of the proposed mine into the south-east Mine Licence Area, would result in loss of important visual resources. It is recommended that this issue be addressed at a strategic level.

The access route from the mine site to the town of Dirkiesdorp is also rated as **negative medium to high** for significance (without mitigation). Dust pollution would be an issue and the dump would remain a permanent visual intrusion in the area. The key visual issue associated with the access road is dust pollution which will be a significant visual intrusion for the residential receptors along the existing gravel route, the Sinethemba Agricultural School and the residents of Dirkiesdorp. Mitigation would include tarring the road from the mine site to the town and therefore the visual significance of the vehicle dust can be reduced to **low**.

# 10 CONCLUSION

A full Level 4 Visual Impact Assessment was undertaken for the proposed Yzermyn Underground Coal Mine (Phase 1). Two site visits were undertaken to the site as well as into the surrounding areas to assess the proposed site in relation to the greater landscape context. Although the direct zone of visual influence excludes the significant visual resources of the Wakkerstroom area, approval of the proposed mine will create risk to the surrounding visual resources. The risks are firstly the proposed mine setting a precedent for further mining in the area and secondly the second phase expansion into the larger Mine Licence Area to the south-east. Although the proposed Phase 1 mine footprint is more visually associated with the undulating rural landscapes to the north, the greater MLA has high levels of scenic quality and is in closer proximity to Wakkerstroom tourism / biodiversity context. Wakkerstroom is an international tourist attraction which is strongly reliant on the preservation of the current visual resources of the town and the surrounding areas.

Due to the potential risks associated with the cumulative visual impacts of the proposed mine, visual significance is defined as **high**. To mitigate this potential cumulative visual impact, should the proposed mine site receive authorisation, further expansion of the mine into the southern mine licence area should be subject to a Strategic Environmental Assessment (SEA). The SEA would need to assess the resilience and thresholds related to the greater Wakkerstroom area biodiversity and eco-tourism in order to make an informed regional decision on the suitability of mining around Wakkerstroom.

# 11 REFERENCES


1. ASTER GDEM. METI / NASA. 2009. Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model Version 2 (GDEM V2 2011). Ministry of Economy, Trade, and Industry (METI) of Japan and United States National Aeronautics and Space Administration (NASA) Source: https://lpdaac.usgs.gov.
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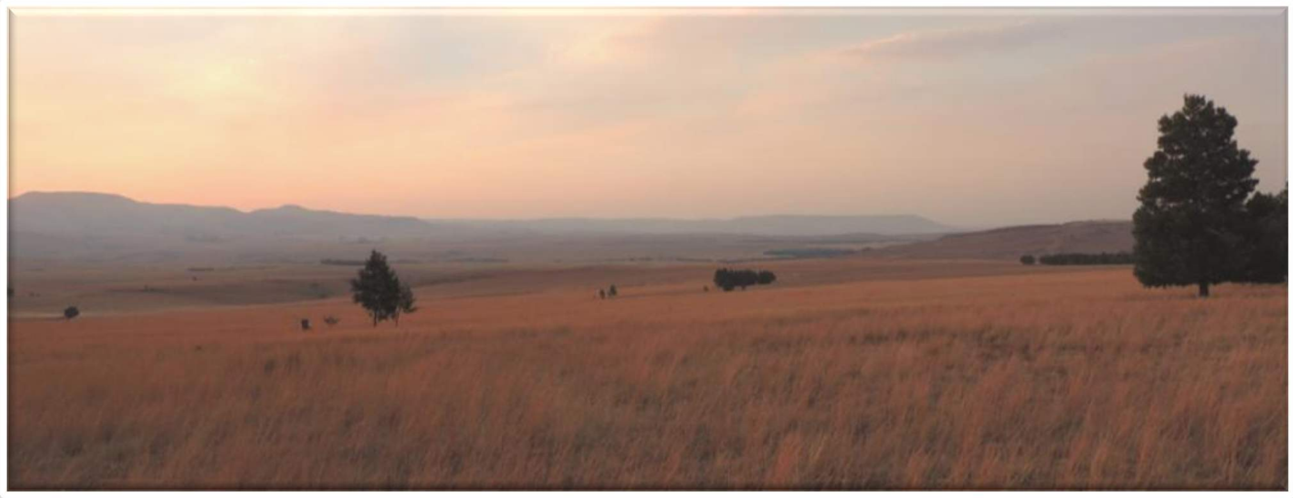
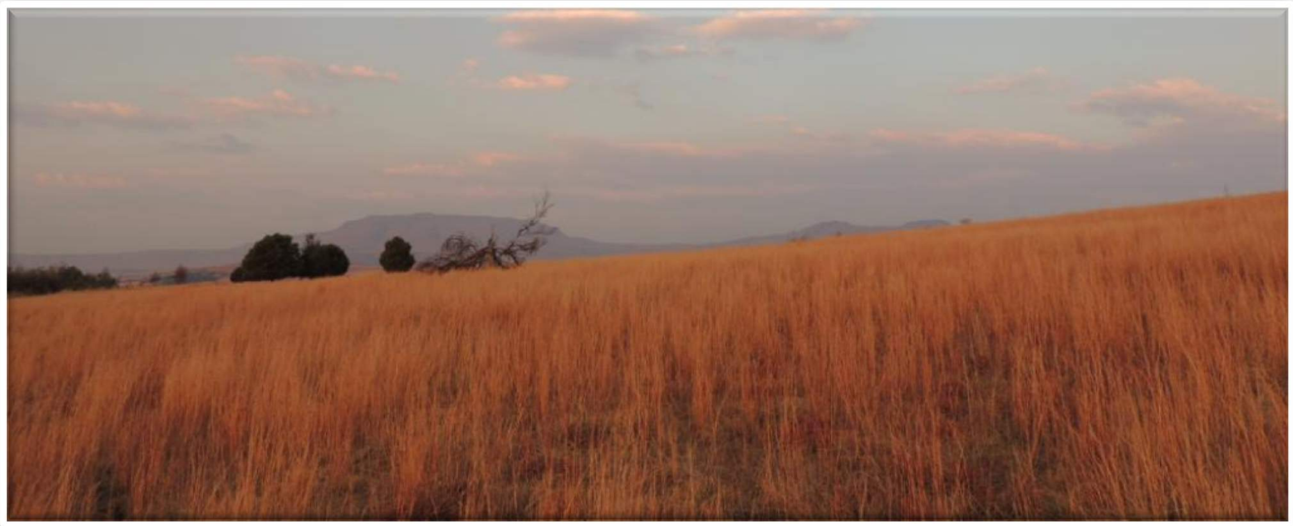
# 12 ANNEXURE 1: SITE PHOTOGRAPHS AND VIEWSHEDS

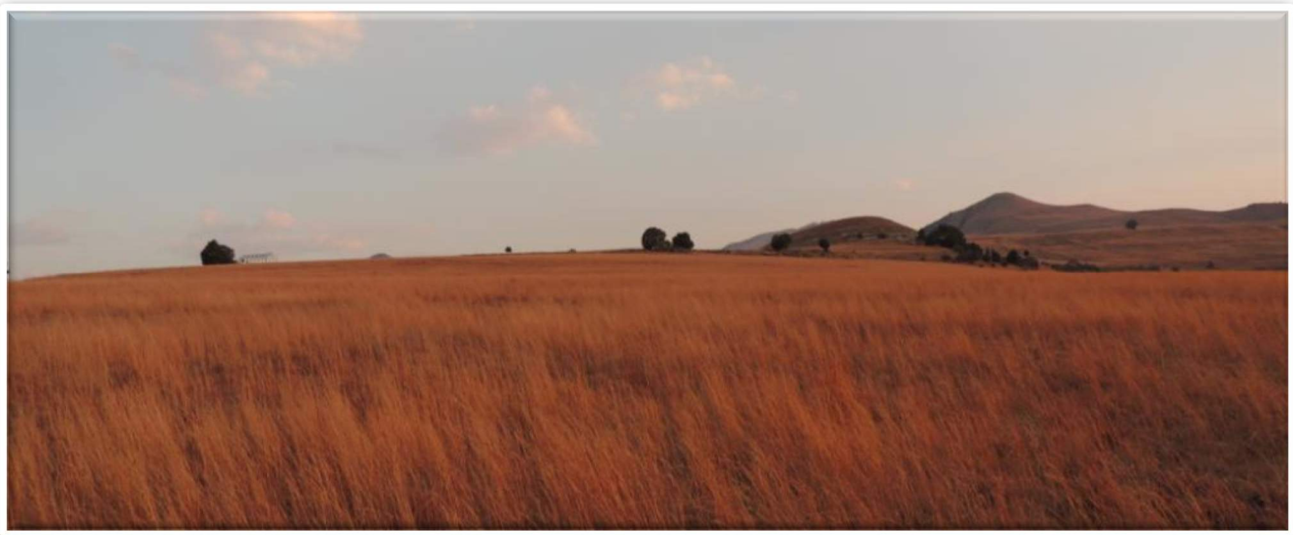
## 12.1 Proposed Mine Sites Photographs



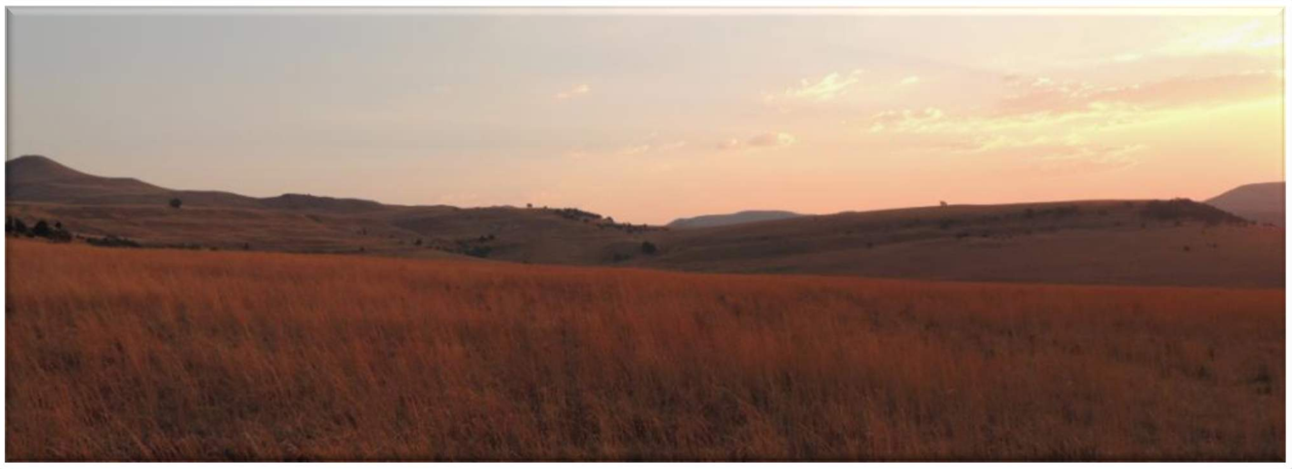
Photograph of proposed site: View North



Photograph of proposed site: View East



Photograph of proposed site: View South



Photograph of proposed site: View West

**Viewshed**

The visible extent or viewshed reflects the area, or extent, where the landscape modification would probably be seen. The information for the terrain used in the visibility analysis is based on is the ASTGTM_S2 3E014 and ASTGTM_S24E014 data set. ASTER GDEM is a product of METI and NASA. (ASTER, Source: https://lpdaac.usgs.gov). The proposed mine viewshed was assessed at an average 40m height from the five project sites identified in the site survey.

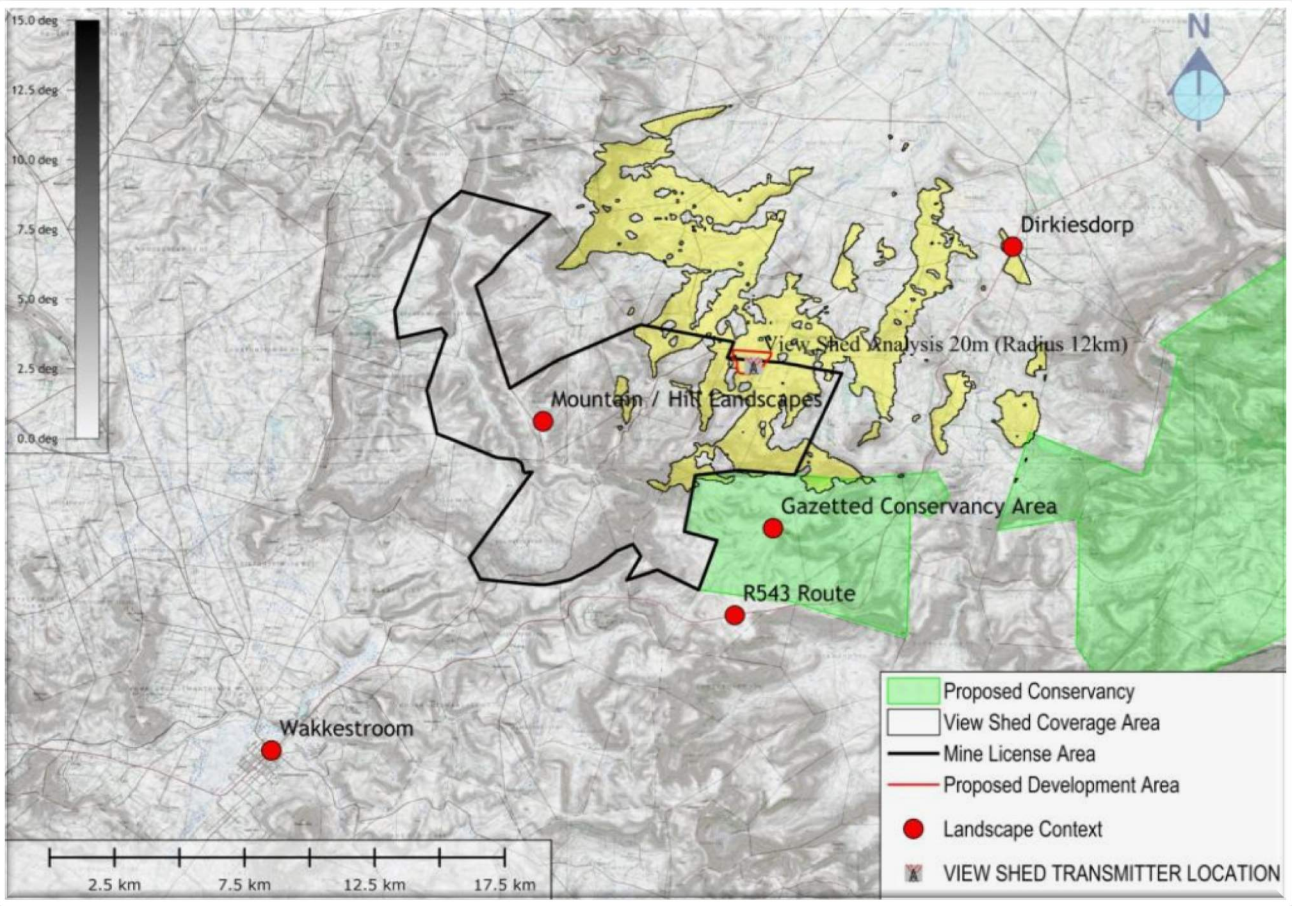



Figure 46: Viewshed of Workshop (20 m) with 12 km ZVI radius overlay onto SG Topographic Map

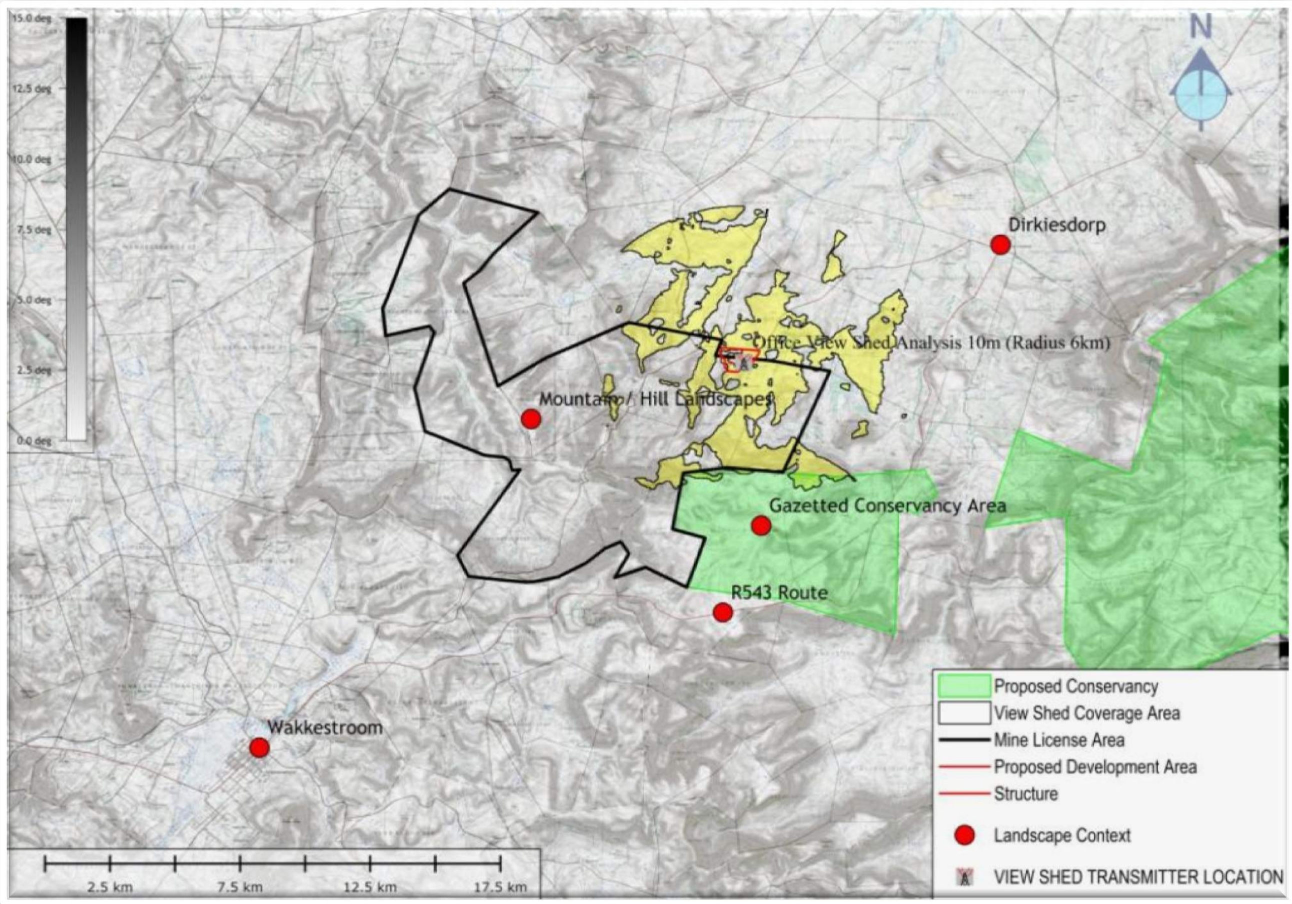



Figure 47: Viewshed of Office (10m)with 6km ZVI radius overlay onto SG Topographic Map

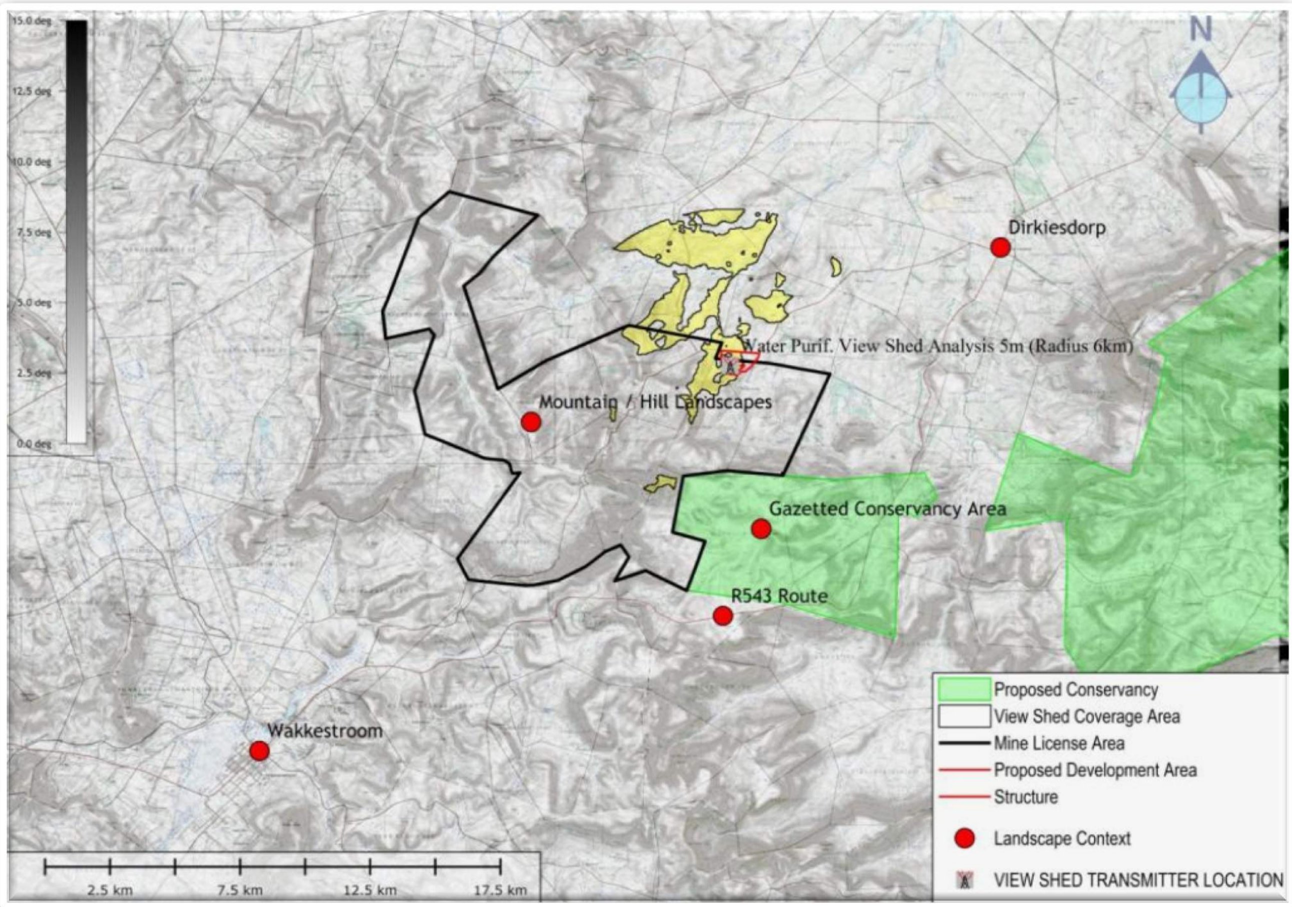



Figure 48: Viewshed of Water Purification plant (5m)with 6km ZVI radiuson Topographic Map

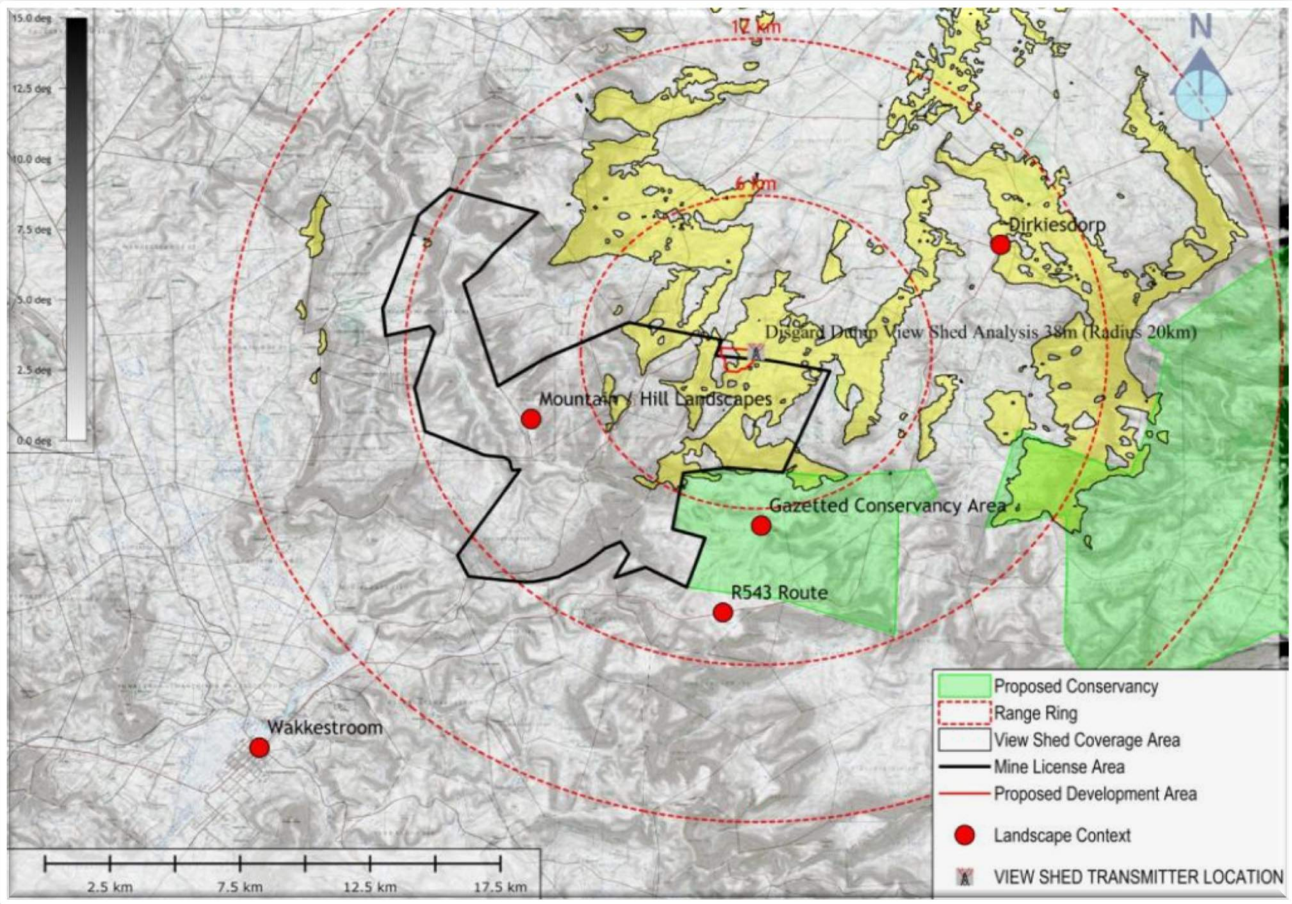
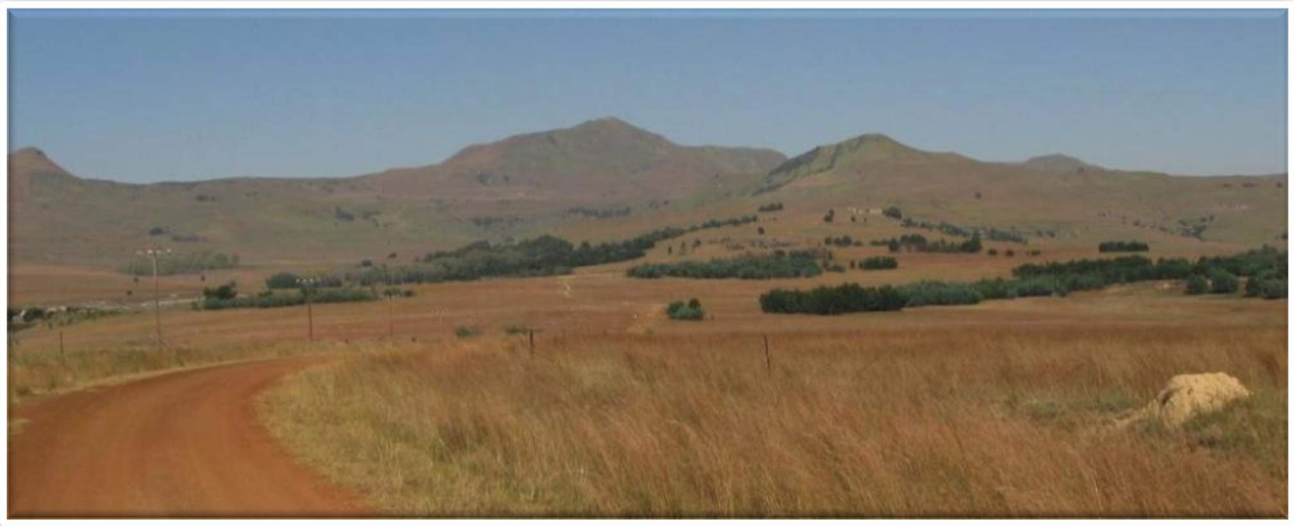
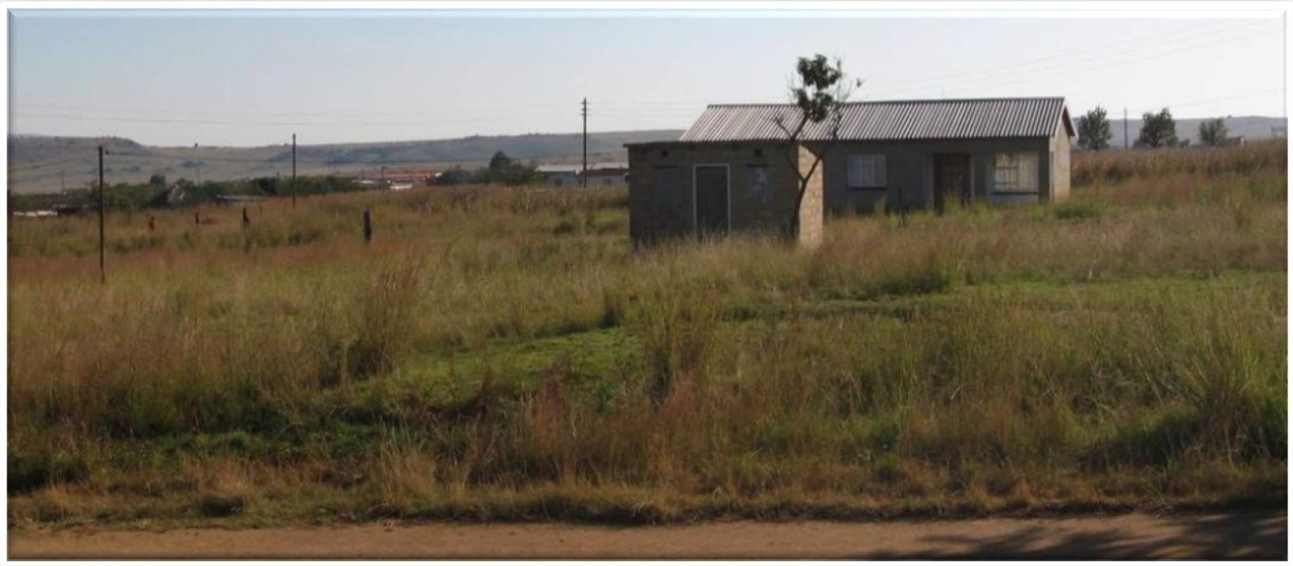



Figure 49: Viewshed of Discard Dump (38m) with 20km ZVI radius on Topographic Map

## 12.2 Proposed Coal Transport Routes



Photograph of existing R543 from S7.



Photograph of existing gravel road with the Dirkiesdorp dwellings in close proximity behind as seen from point S8

Photograph of existing R543 from S9.

## 12.3 Proposed Piet Retief Coal Siding site

Photograph of existing Jindal siding site

Photograph of transport trucks parked at the site.

View of residential areas of Piet Retief as seen from the siding.

## 12.4 Proposed Panbult Coal Siding site

Photograph of existing coal transport trucks

Photograph of existing Panbult siding site

Photograph of existing Panbult siding area

# 13 Annexure 2: Constraints Mapping and Recommendations from the Scoping Phase

Constraints mapping was undertaken in the scoping phase in order to ensure that minimal change takes place to the landscape character due to the proximity to the Gazetted conservation areas and the current non-mining landscape context. Based on the above findings, a VRM mapping exercise was undertaken for the proposed mine site, taking the following landscape features into consideration. The following recommendation were made in the scoping phase of the project.

- Prominent ridgelines are often key features in the landscape and seen as a skyline. This can result in high levels of visual intrusion. A 100m buffer was generated from the two prominent ridgelines identified on the site.
- 1: 4 slopes are important in terms of allowing landscape integrity. Development in these areas increases the potential of erosion and prominence. These areas are also usually visually linked to other natural topographic features and constitute a visual picture which defines the landscape character for the area.
- Topographic features are landscape elements that define the location and regional landscape character. Landscape features in this area include the mountain feature to the south of the site, as well as prominent rocky outcrops to the north.
- By legislation rivers and wetlands must be protected. A buffer of 50m was generated from the main river that could be identified from Google Earth mapping

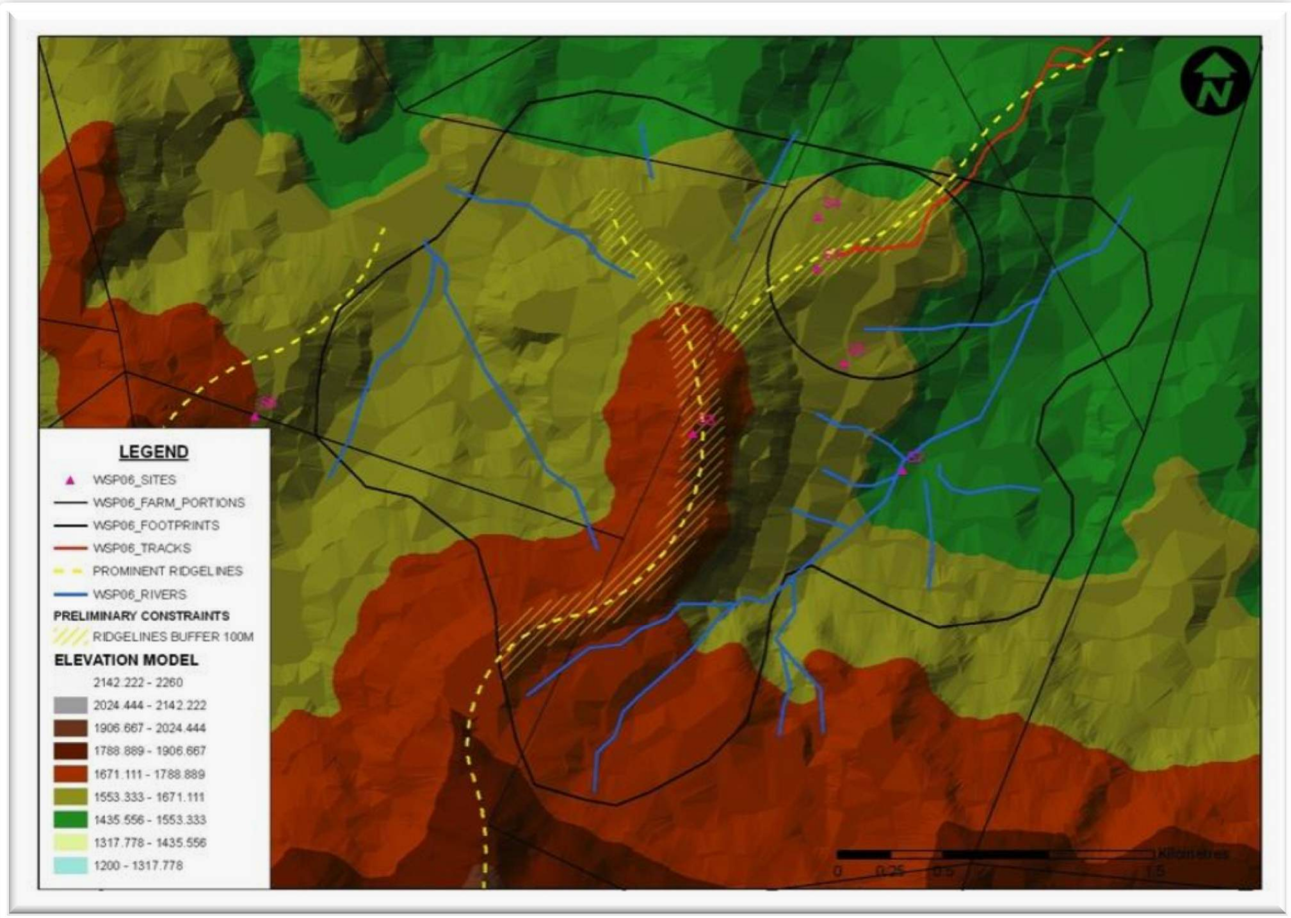



Figure 50:Prominent ridgelines location, and buffer area demarcation

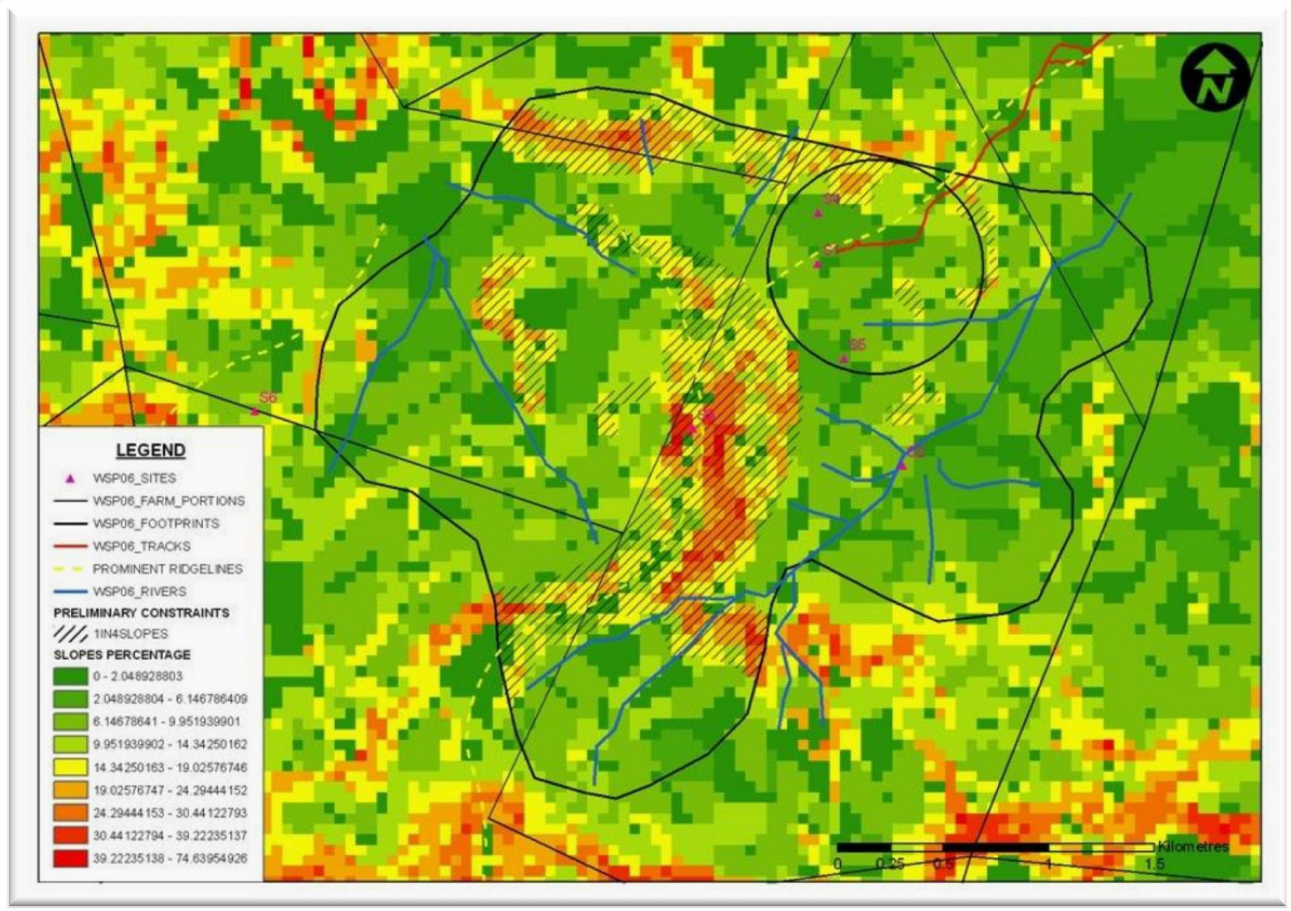



Figure 51:1: 4 slope areas overlaid onto ASTGTM DEM slopes percentage map

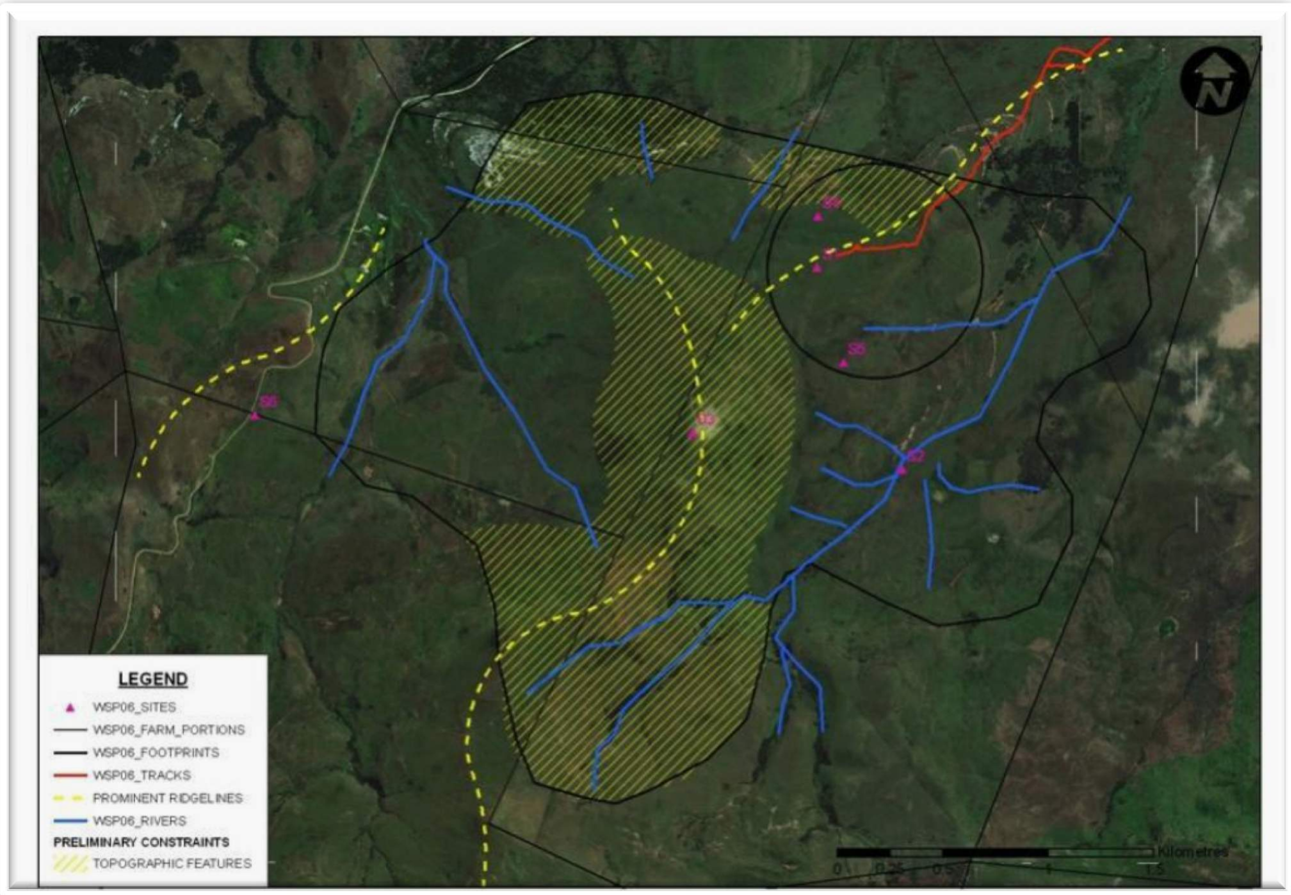



Figure 52:Areas of significant topographic features on Google Earth Satellite image

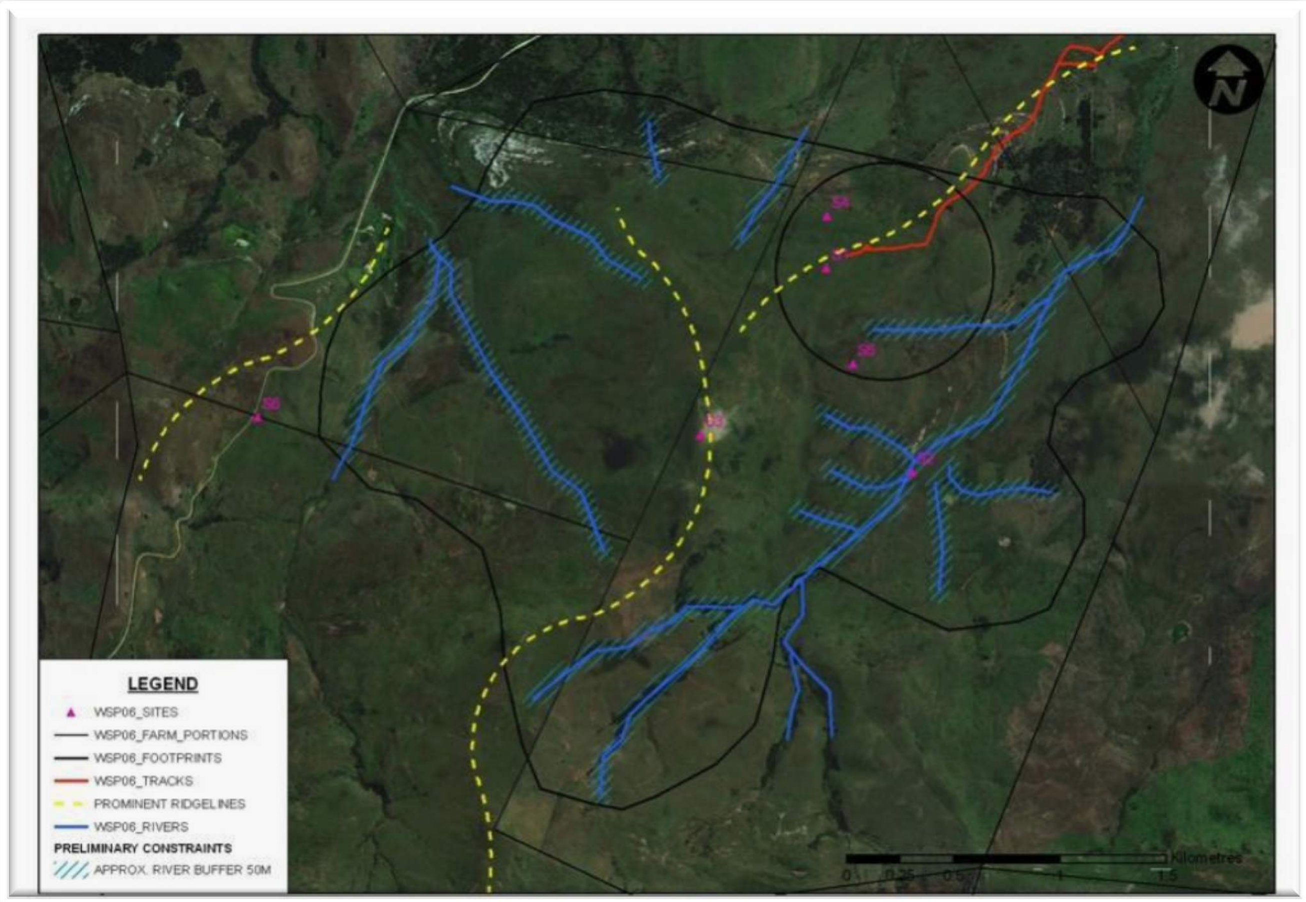



Figure 53:Broad brush river features and 50m river buffer on Google Earth Satellite image

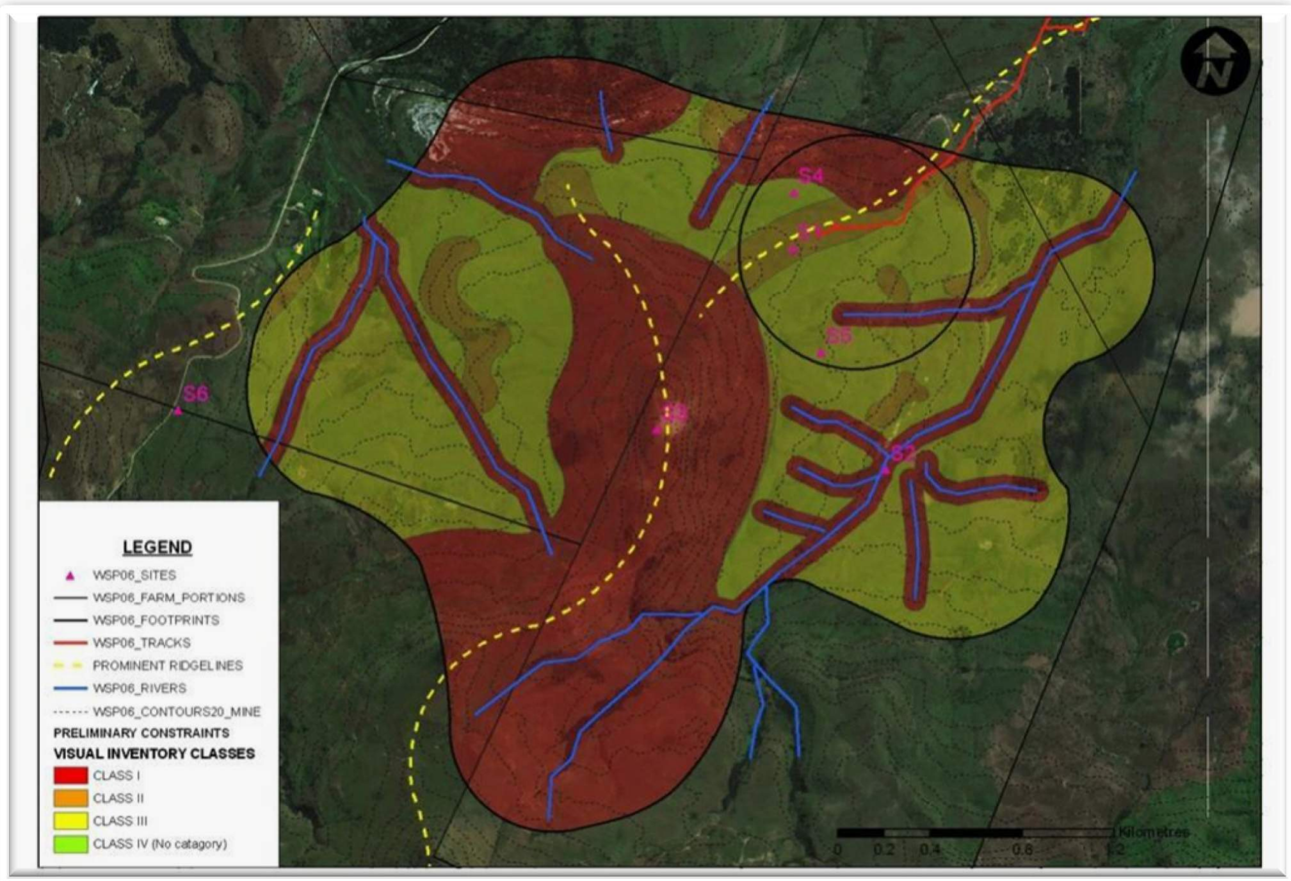



Figure 54:Combined constraints VRM Classes map overlay onto Google Earth Image

- On the proposed mine site, any river or wetland is defined as Class I and it is recommended that no landscape modification should take place within the river context, with a buffer of 50m on either side of the river or river wetlands. The mountain area to the south of the site was also defined as Class I which is not suitable for landscape modification due to the prominence of this area to the south and the significance of this feature to the overall scenic quality and landscape of the surrounding region.
- The strong ridgeline that is located on the site was defined as a Class II. Development on the ridgeline would generate skyline impact and if the landscape modification was large, it would have the potential to influence the predominantly agricultural and tourism sense of place to the north. It is recommended that limited development take place on the ridgeline area. (This recommendation was implemented and the proposed mine was moved off the main ridgelines)
- The North-facing grassy slopes were identified as Class III as this particular orientation is quite exposed and would have a large viewshed extending to the north in which any proposed modification would be clearly visible as the VAC levels are low.
- It is recommended that low levels of modification take place but with strict mitigation in terms of bulk, colour and scaling. This area is not suitable for the bulk mining infrastructure but could be used for administrative-related activities. The east facing grassy slopes are more contained by the topographic terrain and are located within an east-facing topographic bowl. They are defined as a Class III, where moderate levels of modification could take place without significantly altering the surrounding sense of place.
- Maintaining the existing rural sense of place, moderate levels of modification could take place in the area but with strict mitigation in terms of colour so that contrast to the existing khaki grays of the veldt grasses is not excessive.
- Reducing the height of the proposed activities as much as possible and careful location needs to be undertaken to ensure these do not dominate the landscape. The possibility of moving the mining site slightly to the north-east into the area of alien Wattle grove should be considered as this area is less prominent and is already disturbed by alien vegetation. (This recommendation was implemented and the proposed mine was relocated further down slope in a less prominent location closer to the wattle grove)

# 14 ANNEXURE 3: SPECIALIST DETAILS

## 14.1 Declaration of Independence

**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

| | | | |
|---|---|---|---|
| Specialist: | VRM AFRICA CC | | |
| Contact person: | STEPHEN STEAD | | |
| Postal address: | P.O BOX 7233, BLANCO | | |
| Postal code: | 6531 | Cell: | 083 560 9911 |
| Telephone: | 044 874 0020 | Fax: | 086 653 3738 |
| E-mail: | steve@vrma.co.za | | |
| Professional affiliation(s) (if any) | Association of Professional Heritage Practitioners South Africa (APHP) | | |

The specialist appointed in terms of the Regulations

I, **STEPHEN STEAD**, declare that ---

General declaration:

- I act as the independent specialist in this application
  I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

**SILVER SOLUTIONS TRADING AS VRM AFRICA**

Name of company (if applicable):

**23 JANUARY 2013**

Date:

## 14.2 Curriculum Vitae

# Curriculum Vitae (CV)

1. **Position**: Owner / Director
2. **Name of Firm**: Visual Resource Management Africa cc *(www.vrma.co.za)*
3. **Name of Staff**: Stephen Stead
4. **Date of Birth**: 9 June 1967
5. **Nationality:** South African
6. **Contact Details:** **Tel: +27 (0) 44 876 0020**
   **Cell: +27 (0) 83 560 9911**
   **Email: steve@vrma.co.za**

7. **Educational qualifications**:
   - University of Natal (Pietermaritzburg): Bachelor of Arts: Psychology and Geography; and Bachelor of Arts (Hons): Human Geography and Geographic Information Management Systems.

8. **Professional Accreditation**
   - Association of Professional Heritage Practitioners (APHP) Western Cape
     - Accredited VIA practitioner member of the Association (2011)

9. **Association involvement:** :
   - International Association of Impact Assessment (IAIA) South African Affiliate
     - Past President (2012 - 2013);
     - President (2012);
     - President-Elect (2011);
     - Conference Co-ordinator (2010);
     - National Executive Committee member (2009); and
     - Southern Cape Chairperson (2008).

10. **Conferences Attended:**
    - IAIAsa 2012;
    - IAIAsa 2011;
    - IAIA International 2011 (Mexico);
    - IAIAsa 2010;
    - IAIAsa 2009; and
    - IAIAsa 2007.

11. **Continued Professional Development:**
    - Integrating Sustainability with Environment Assessment in South Africa (IAIAsa Conference, 1 day)
    - Achieving the full potential of SIA (Mexico, IAIA Conference, 2 days 2011)
    - Researching and Assessing Heritage Resources Course (University of Cape Town, 5 days, 2009)

12. **Countries of Work Experience**:
    - South Africa, Mozambique, Malawi, Lesotho, Kenya and Namibia

13. **Relevant Experience:**
    Stephen gained six years of experience in the field of Geographic Information Systems mapping and spatial analysis working as a consultant for the KwaZulu-Natal Department of Health and then with an Environmental Impact Assessment company based in the Western Cape. In 2004 he set up the company Visual Resource Management Africa which specializes in visual resource management and visual impact assessments in Africa. The company makes use of the well documented Visual Resource Management methodology developed by the Bureau of Land Management (USA) for assessing the suitability of landscape modifications. In association with ILASA qualified landscape architect Liesel Stokes, he has assessed of over 100 major landscape modifications through-out southern and eastern

Africa. The business has been operating for eight years and has successfully established and retained a large client base throughout Southern Africa which include amongst other, Rio Tinto (Pty) Ltd, Bannerman (Pty) Ltd, Anglo Coal (Pty) Ltd, Eskom (Pty) Ltd, NamPower and Vale (Pty) Ltd, Ariva (Pty) Ltd, Harmony Gold (Pty) Ltd, Mellium Challenge Account (USA), Pretoria Portland Cement (Pty) Ltd

**14. Languages:**

- English – First Language
- Afrikaans – fair in speaking, reading and writing

**15. Projects:**

A list of ***some*** of the large scale projects that VRMA has assessed has been attached below with the client list indicated per project (Refer to www.vrma.co.za for a full list of projects undertaken).

| YEAR | NAME | DESCRIPTION | CLIENT | LOCATION |
|---|---|---|---|---|
| 2013 | Houwhoek Eskom Substation | Substation | Eskom | W Cape |
| 2013 | Drennan PV | PV | | E Cape |
| 2013 | Mulilo PV Project | PV | Mulilo | N Cape |
| 2013 | CWDM Landfill Site | Landfill | CWDM | W Cape |
| | | | | |
| 2012 | Afrisam Saldanha | Mine | AfriSAM | Saldana (W Cape) |
| 2012 | Ncondezi Power Station | Plant | Ncondezi Coal | Mozambique |
| 2012 | MET Housing Etosha Amended MCDM | Residential | Millennium Challenge | Namibia |
| 2012 | Kangnas Wind | Energy | Mainstream Renewable Power SA | N Cape |
| 2012 | Kangnas PV | Energy | Mainstream Renewable Power SA | N Cape |
| 2012 | Rossing Z20 Infrastructure Corridor | Infrastructure | Rio Tinto | Namibia |
| 2012 | MET Housing Etosha | Housing | MET | Namibia |
| 2012 | Qwale Mineral Sands | Mine | Base Resources | Kenya |
| 2012 | Houhoek Substation | Transmission | Eskom | Western Cape |
| 2012 | Bannerman Etango Mine Phase 2 | Mining | Bannerman | Namibia |
| 2012 | Letseng Diamond Transmission Line Upgrade | Powerline | Gem Diaminds | Lesotho |
| 2012 | Letseng Diamond Mine Projet Kholo | Mine | Gem Diamonds | Lesotho |
| 2012 | Drennan PV | PV | | Eastern Cape |
| 2012 | George Social Infrastructure | Analysis | George Municipal Area | George |
| 2012 | Lunsklip Windfarm | Windfarm | Bergwind | Stilbaai |
| 2012 | Hoodia Solar | PV expansion | | Beaufort West |
| 2012 | Bitterfontein | Energy | WEPTEAM | N Cape |
| 2012 | Bitterfontein slopes | Slopes Analysis | WEPTEAM | N Cape |
| 2012 | Knysna Affordable Housing | Residential | Knysna Municipality | Knysna |
| 2012 | KAH Hornlee Project | Residential | Knysna Municipality | Knysna |
| 2012 | Kobong Hydro | Dam / Powerline | Lesotho Highlands Water | Lesotho |
| 2012 | Otjikoto Gold Mine | Mining | ASEC | Namibia |
| 2012 | Mozambique Gas Engine Power Plant | Plant | Sasol | Mozambique |
| 2012 | SAPPI Boiler Upgrade | Plant | SAPPI | Mpumalanga |
| 2012 | Upington CSP | solar Power | Sasol | Northern Cape |
| 2012 | Rossing Z20 Mine | Mining | Rio Tinto | Namibia |
| 2012 | Eastern Cape Mari-culture | Mari-culture | Department of Agriculture, forestry and Fisheries | Western Cape |
| | | | | |
| 2011 | Vodacom Mast | Structure | Vodacom | Reichterbosch |
| 2011 | Weldon Kaya | Residential | Private | Plettenberg Bay |
| 2011 | Hornlee | Housing | ABSA | Knysna |
| 2011 | Erongo Uranium Rush SEA | SEA | SAIEA | Namibia |
| 2011 | Damkoppie | Residential | Private | Western Cape |
| 2011 | Moquini Hotel | Structure | Costa Zeerva Developments | Western Cape |
| 2011 | Bon Accord Nickel Mine | Mine | African Nickel | Barbeton |
| 2011 | Rossing Uranium Mine Phase 2 | Mining | Rio Tinto | Namibia |
| 2011 | Rossing South Board Meeting | Mining | Rio Tinto | Namibia |

| | | | | |
|---|---|---|---|---|
| 2011 | Floating Liquified Natural Gas Facility | Structure | PetroSA | Mossel Bay |
| 2011 | Khanyisa Power Station | Power Station | Anglo Coal | Western Cape |
| 2011 | PPC Rheebieck West Upgrade | Industrial | PPC | Western Cape |
| 2011 | Vale Moatize Railway 1 | Mining_rail | VALE | Mozambique |
| 2011 | Vale Moatize Coal Mine | Mining_rail | VALE | Mozambique |
| 2011 | Vale Moatize Railway 2 | Mining_rail | VALE | Mozambique |
| 2011 | Vale Moatize Railway 3 | Mining_rail | VALE | Mozambique |
| 2011 | Vale Moatize Railway 4 | Mining_rail | VALE | Mozambique |
| 2011 | Olvyn Kolk PV | Solar Power | | Northern Cape |
| 2011 | Beaufort West Urban Edge | Mapping | Willem de Kock Planners | Beaufort West |
| 2011 | ERF 7288 PV | PV | | Beaufort West |
| 2011 | Erf 7288 Beaufort West | Slopes | | Beaufort West |
| 2011 | N2 Herolds Bay Residental | Residential | MMS Developers | Herolds Bay |
| 2011 | Southern Arterial | Road | George Municipality | George |
| 2011 | De Bakke Cell Phone Mast | Mast | Vodacom | Western Cape |
| 2011 | Ruitesbosch | Mast | Vodacom | Western Cape |
| 2011 | Wadrif Dam | Dam | Plett Municipality | Western Cape |
| 2011 | George Western Bypass | Road | George Municipal Area | George |
| 2011 | Gecko Namibia | Industrial | Vision Industrial Park | |
| 2011 | Hartenbos Quarry Extension | Mining | Onifin(Pty) Ltd | Mossel Bay |
| 2011 | Wadrif Dam | Dam | Plettenberg Municipality | Beaufort West |
| 2011 | Kathu CSP | Solar Power | | Northern Cape |
| 2011 | Sasolburg CSP | Solar Power | | Free State |
| | | | | |
| 2010 | George Open Spaces System | George SDF | George Municipal Area | George |
| 2010 | Sedgefield Water Works | Structure | Knysna Municipality | Sedgefield |
| 2010 | George Visual Resource Management | George SDF | George Municipal Area | George |
| 2010 | George Municipality SDF | George SDF | George Municipal Area | George |
| 2010 | Green View Estates | Residential | | Mossel Bay |
| 2010 | Wolwe Eiland Access Route | Road | Theo Ciliers | Victoria Bay |
| 2010 | Asazani Zinyoka UISP Housing | Residential | Mossel Bay Municipality | Mossel Bay |
| 2010 | MTN Lattice Hub Tower | Structure | MTN | George |
| 2010 | Destiny Africa | Residential | KDFM | George |
| 2010 | Farm Dwarsweg 260 | Residential | Hoogkwatier Landgoed | Great Brak |
| 2010 | Bantamsklip GIS Mapping | Mapping | Eskom | Western Cape |
| 2010 | Bantamsklip Transmission Revision | Transmission | Eskom | Eastern Cape |
| 2010 | Le Grand Golf and Residential Estate | Residenti | Private | George |
| 2010 | Ladywood Farm 437 | Residential | Private | Plettenberg Bay |
| 2010 | Pezula Infill (Noetzie) | Residential | Pezula Golf Estate | Knysna |
| 2010 | Stonehouse Development | Residential | Private | Plettenberg Bay |
| | | | | |
| 2009 | Eden Telecommunication Tower | Tower | Africon Engineering | George |
| 2009 | Walvis Bay Power Station | Structure | NamPower | Namibia. |
| 2009 | OCGT Power Plant Extension | Power Plant | Eskom | Mossel Bay |
| 2009 | Rossing Uranium Mine Phase 1 | Mining | Rio Tinto | Namibia |
| 2009 | RUL Sulpher Handling Facility | Mining | Rio Tinto | Walvis Bay |
| 2009 | Boggomsbaai | Slopes | Private | Boggomsbaai |
| 2009 | Still Bay East | Mapping | DelPlan | SA, WC |
| 2009 | Bannerman Etango Uranium Mine | Mining | Bannerman | Namibia |
| 2009 | George Municipality Densification | George SDF | George Municipal Area | George |
| 2009 | Oudtshoorn Municipality SDF | Mapping | Oudtshoorn Municipality | Oudtshoorn |
| 2009 | Harmony Gold Mine | Mining | Harmony | Mpumalanga. |
| 2009 | Ryst Kuil/Riet Kuil Uranium Mine | Mining | Turgis | Beaufort West |
| 2009 | Trekkopje Uranium Mine | Mining | Trekkopje Uranium Mine | Namibia |
| 2009 | Calitzdorp Retirement Village | Residential | Pretorius Family Trust | Calitzdorp |
| 2009 | Wilderness Erf 2278 | Residential | Albert Hanekom | Wilderness |
| 2009 | Wolwe Eiland Eco & Nature Estate | Residential | Theo Ciliers | Victoria Bay |
| 2009 | Zebra Clay Mine | Mining | Private | Zebra |
| 2009 | Fancourt Visualisation Modelling | Visualisation | Fancourt Golf Estate | George |
| 2009 | Erf 251 Damage Assessment | Residential | Private | Great Brak |
| 2009 | Lagoon Bay Lifestyle Estate | Residential | Lagoon Bay Estate | Glentana |

| | | | | |
|---|---|---|---|---|
| 2009 | Lagoon Garden Estate | Residential | Dreamveldt | Great Brak |
| 2009 | Moquini Beach Hotel | Resort | Kostas Zervas | Mossel Bay |
| 2009 | Knysna River Reserve | Residential | Private | Knysna |
| 2009 | Paradyskloof Residential Estate | Residential | Private | Stellenbosch |
| | | | | |
| 2008 | Trekkopje Desalination Plant | Structure | Trekkopje Uranium Mine | Namibia |
| 2008 | Hartenbos Landgoed Phase 2 | Residential | Willem van Rensburg | Hartenbos |
| 2008 | Hartenbos River Park | Residential | Adlequelle | Hartenbos |
| 2008 | Hersham Security Village | Residential | Private | Great Brak |
| 2008 | Kaaimans Project | Residential | Fritz Fenter | Wilderness |
| 2008 | Kloofsig Development | Residential | Muller Murray Trust | Vleesbaai |
| 2008 | Rheebok Development Erf 252 Apeal | Residential | Farm Searles | Great Brak |
| 2008 | Riverhill Residential Estate | Residential | Theo Cilliers | Wilderness |
| 2008 | Camdeboo Estate | Resort | Private | Graaff Reinet |
| 2008 | Oasis Development | Residential | Private | Plettenberg Bay |
| 2008 | Outeniquabosch Safari Park | Residential | Private | Mossel Bay |
| 2008 | George Airport Radar Tower | Tower | ACSA | George |
| 2008 | Lakes Eco and Golf Estate | Residential | Private | Sedgefield |
| 2008 | Pinnacle Point Golf Estate | Residential | Private | Mossel Bay |
| 2008 | Paradise Coast | Residential | Private | Mossel Bay |
| 2008 | Fynboskruin Extention | Residential | Ballabarn Three | Sedgefield |
| 2008 | Gansevallei | Residential | Pieter Badenhorst | Plettenberg Bay |
| 2008 | Hanglip Golf and Residential Estate | Residential | Pieter Badenhorst | Plettenberg Bay |
| 2008 | Proposed Hotel Farm Gansevallei | Resort | Wendy Floyd Planners | Plettenberg Bay |
| 2008 | Uitzicht Development | Residential | Private | Knysna |
| 2008 | Hansmoeskraal | Slopes Analysis | Private | George |
| 2008 | Kruisfontein Infill | Mapping | SetPlan George | Knysna |
| 2008 | Mount View Tourist Distination | Mapping | SetPlan | Western Cape |
| 2008 | Welgevonden | Visualisation | SetPlan George | De Rust |
| 2008 | Pierpoint Nature Reserve | Residential | Private | Knysna |
| 2008 | West Dunes | Residential | Private | Knysna |
| | | | | |
| 1998 | Greater Durban Informal Housing Analysis | GIS | Durban Municipality | Durban |

**Certification:**
*I confirm that the above CV is an accurate description of my experience and qualifications and that I am available to serve in the position indicated for me in the proposal for this project.*

Yours faithfully,

Stephen Stead, Director

# 15 ANNEXURE 4: METHODOLOGY

Visual impact is defined as 'the effect of an aspect of the development on a specified component of the visual, aesthetic or scenic environment within a defined time and space.' *(Oberholzer, B., 2005)*. As identified in this definition, 'landscapes are considerably more than just the visual perception of a combination of landform, vegetation cover and buildings, as they embody the history, landuse, human culture, wildlife and seasonal changes to an area.' *(U.K IEMA, 2002)*. These elements combine to produce distinctive local character that will affect the way in which the landscape is valued and perceived.

VRM Africa's objective is to provide Interested and Affected Parties (I&APs) and decision-makers with sufficient information to take "early opportunities for avoidance of negative visual effects." This is based on the U.K. and Assessment's (IEMA), and South Africa's Western Cape Department of Environmental Affairs and Development Planning's (DEA&DP), guidelines:

- "The ideal strategy for each identifiable, negative effect is one of avoidance. If this is not possible, alternative strategies of reduction, remediation and compensation may be explored. If the consideration of mitigation measures is left to the later stages of scheme design, this can result in increased mitigation costs because early opportunities for avoidance of negative visual effects are missed."*(U.K IEMA, 2002)*.
- "In order to retain the visual quality and landscape character, management actions must become an essential part of the guidelines throughout construction and operation.Proper management actions ensure that the lowest possible impact is created by the proposed project.
- Ongoing monitoring programmes, with regard to the control of aesthetic aspects, for all stages of the proposed project, are a vital component, ensuring that the long-term visual management objectives are met."*(Oberholzer, B., 2005)*.

The impact assessment methodology that VRM Africa uses is based on the VRM methodology developed by the United States Bureau of Land Management (BLM) in that the study involves the measurement of contrast in the form, line, texture and colour of the proposed landscape modification, against the same elements found in the natural landscape. The contrast rating is a systematic process undertaken from KOPs surrounding the proposed project site, and the assessment of the degree of contrast (DoC) is used to evaluate the potential visual impacts associated with the proposed landscape modifications. The method is based on the premise that the degree to which a proposed landscape modification affects the visual quality of a landscape depends on the visual contrast created between a project and the existing landscape *(USA Bureau of Land Management, 2004)*.

*<u>Landscape Significance</u>*

Landscape significance is assessed in order to highlight the nature and degree of significance of the landscape context by differentiating between those landscapes of recognized or potential significance or sensitivity to modification to those landscape contexts that have low sensitivity and scenic value. 'Different levels of scenic values require different levels of management. For example, management of an area with high scenic value might be focused on preserving the existing character of the landscape, and management of an area with little scenic value might allow for major modifications to the landscape. Determining how an area should be managed first requires an assessment of the area's scenic values. Assessing scenic values and determining visual impacts can be a subjective process. Objectivity and consistency can be greatly increased by using standard assessment criteria to describe and evaluate landscapes, and to also describe proposed projects.' *(USA Bureau of Land Management, 2004)*.

*<u>Viewshed Analysis</u>*

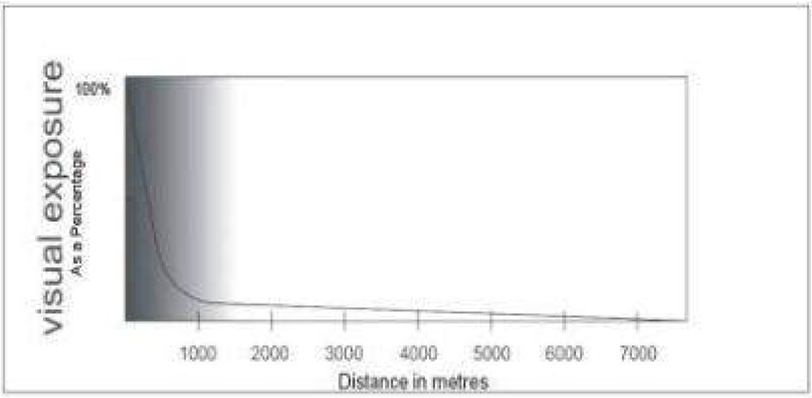
A viewshed is 'the outer boundary defining a view catchment area, usually along crests and ridgelines' *(Oberholzer, B., 2005)*. This reflects the area within which, or the extent to which, the landscape modification is likely to be seen. It is important to assess the extent to which the proposed landscape modifications are visible in the surrounding landscape, as a point of departure for defining the shared landscape context, and to identify the receptors making use of the common views.

Viewshed analyses are not absolute indicators of the level of significance, but an indication of potential visibility *(Centre for Advanced Spatial Analysis, 2002)*. Once the sites and heights of the proposed activities have been finalised, the viewshed analysis will be undertaken.

*Receptor Exposure*

The area where a landscape modification starts to influence the landscape character is termed the Zone of Visual Influence (ZVI) and is defined by the U.K.Institute of Environmental Management and Assessment(IEMA) publication*'Guidelines for Landscape and Visual Impact Assessment'* as 'the area within which a proposed development may have an influence or effect on visual amenity (of the surrounding areas).'

The inverse relationship of distance and visual impact is well recognised in visual analysis literature *(Hull, R.B. and Bishop, I.E., 1988)*. According to Hull and Bishop, exposure, or visual impact, tends to diminish exponentially with distance. The areas where most landscape modifications would be visible are located within 2 km from the site of the landscape modification. Thus the potential visual impact of an object diminishes at an exponential rate as the distance between the observer and the object increases due to atmospheric conditions prevalent at a location, which causes the air to appear greyer, thereby diminishing detail. For example, viewed from 1000 m from a landscape modification, the impact would be 25% of the impact as viewed from 500 m from a landscape modification. At 2000m it would be 10% of the impact at 500 m. The relationship is indicated in the following graph generated by Hull and Bishop.




## 15.1 Distance Zones

The VRM methodology also takes distance from a landscape modification into consideration in terms of understanding visual resource. Three distance categories are defined by the Bureau of Land Management. The distance zones are:

1. ***Foreground / Middle ground***, up to approximately 6km, which is where there is potential for the sense of place to change;
2. ***Background areas***, from 6km to 24km, where there is some potential for change in the sense of place, but where change would only occur in the case of very large landscape modifications; and
3. ***Seldom seen areas***, which fall within the Foreground / Middle ground area but, as a result of no receptors, are not viewed or are seldom viewed.

## 15.2 Scenic Quality

In the VRM methodology, scenic quality is a measure of the visual appeal of a tract of land. In the visual resource inventory process, public lands are given a rating based on the apparent scenic quality, which is determined using seven key factors. During the rating process, each of these factors is ranked on a comparative basis with similar features in the region *(USA Bureau of Land Management, 2004)*. These seven elements are:

1. **Landform:** Topography becomes more interesting as it gets steeper, or more massive, or more severely or universally sculptured.
2. **Vegetation:** Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Also consider smaller-scale vegetation features which add striking and intriguing detail elements to the land.

3. **Water:** That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration.
4. **Colour:** Consider the overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "colour" are variety, contrast and harmony.
5. **Scarcity:** This factor provides an opportunity to give added importance to one, or all, of the scenic features that appear to be relatively unique or rare within one physiographic region.
6. **Adjacent Land Use:** Degree to which scenery, outside the scenery unit being rated, enhances the overall impression of the scenery within the rating unit. The distance,at which adjacent scenery will start to influence scenery within the rating unit ranges, depending upon the characteristics of the topography, the vegetative cover, and other such factors.
7. **Cultural Modifications:** Cultural modifications in the landform, water, and vegetation, and addition of structures, should be considered, and may detract from the scenery in the form of a negative intrusion, or complement or improve the scenic quality of a unit.

*Receptor Sensitivity Rating Criteria*
*A= scenic quality rating of ≥19;*
*B = rating of 12 – 18; and*
*C= rating of ≤11.*

*Scenic Quality Rating Questionnaire*

| **KEY FACTORS** | **RATING CRITERIA AND SCORE** | | |
|---|---|---|---|
| **SCORE** | **5** | **3** | **1** |
| Land Form | High vertical relief as expressed in prominent cliffs, spires or massive rock outcrops, or severe surface variation or highly eroded formations including dune systems: or detail features that are dominating and exceptionally striking and intriguing. | Steep-sided river valleys, or interesting erosion patterns or variety in size and shape of landforms; or detail features that are interesting, though not dominant or exceptional. | Low rolling hills, foothills or flat valley bottoms; few or no interesting landscape features. |
| Vegetation | A variety of vegetative types as expressed in interesting forms, textures and patterns. | Some variety of vegetation, but only one or two major types. | Little or no variety or contrast in vegetation. |
| Water | Clear and clean appearing, still or cascading white water, any of which are a dominant factor in the landscape. | Flowing, or still, but not dominant in the landscape. | Absent, or present but not noticeable. |
| Colour | Rich colour combinations, variety or vivid colour: or pleasing contrasts in the soil, rock, vegetation, water. | Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element. | Subtle colour variations contrast or interest: generally mute tones. |
| Adjacent Scenery | Adjacent scenery greatly enhances visual quality. | Adjacent scenery moderately enhances overall visual quality. | Adjacent scenery has little or no influence on overall visual quality. |
| Scarcity | One of a kind: unusually memorable, or very rare | Distinctive, though somewhat similar to | Interesting within its setting, but fairly |

| | | | |
|---|---|---|---|
| | within region. Consistent chance for exceptional wildlife or wildflower viewing etc. | others within the region. | common within the region. |
| **SCORE** | **2** | **0** | **-4** |
| Cultural Modification | Modifications add favourably to visual variety, while promoting visual harmony. | Modifications add little or no visual variety to the area, and introduce no discordant elements. | Modifications add variety but are very discordant and promote strong disharmony. |

### 15.3 Receptor Sensitivity

Sensitivity levels are a measure of public concern for scenic quality. Public lands are assigned high, medium or low sensitivity levels by analysing the various indicators of public concern. The following criteria were used to assess the sensitivity of each of the communities:

- **Public Interest:** The visual quality of an area may be of concern to local, state, or national groups. Indicators of this concern are usually expressed in public meetings, letters, newspaper or magazine articles, newsletters, landuse plans, etc. Public controversy, created in response to proposed activities that would change the landscape character, should also be considered.
- **Special Areas:** Management objectives for special areas such as natural areas, wilderness areas or wilderness study areas, wild and scenic rivers, scenic areas, scenic roads or trails, and Areas of Critical Environmental Concern (ACEC), frequently require special consideration for the protection of visual values. This does not necessarily mean that these areas are scenic, but rather that one of the management objectives may be to preserve the natural landscape setting. The management objectives for these areas may be used as a basis for assigning sensitivity levels.
- **Adjacent Land Uses:** The interrelationship with land uses in adjacent land can affect the visual sensitivity of an area. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be visually sensitive.
- **Type of User:** Visual sensitivity will vary with the type of users. Recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
- **Amount of Use:** Areas seen and used by large numbers of people are potentially more sensitive. Protection of visual values usually becomes more important as the number of viewers increase *(USA Bureau of Land Management, 2004)*.

*<u>Receptor Sensitivity Rating Criteria</u>*

*The level of visual impact considered acceptable is dependent on the types of receptors.*

- *High sensitivity : e.g. residential areas, nature reserves and scenic routes or trails*
- *Moderate sensitivity : e.g. sporting or recreational areas, or places of work*
- *Low sensitivity : e.g. industrial, mining or degraded areas*

*<u>Sensitivity Level Rating Questionnaire</u>*

| **FACTORS** | **QUESTIONS** | |
|---|---|---|
| **Type of Users** | **Maintenance of visual quality is:** | |
| | A major concern for most users | High |
| | A moderate concern for most users | Moderate |
| | A low concern for most users | Low |
| **Amount of use** | **Maintenance of visual quality becomes more important as the level of use increases:** | |
| | A high level of use | High |

| | | |
|---|---|---|
| | Moderately level of use | Moderate |
| | Low level of use | Low |
| **Public interest** | **Maintenance of visual quality:** | |
| | A major concern for most users | High |
| | A moderate concern for most users | Moderate |
| | A low concern for most users | Low |
| **Adjacent land Users** | **Maintenance of visual quality to sustain adjacent land use objectives is:** | |
| | Very important | High |
| | Moderately important | Moderate |
| | Slightly important | Low |
| **Special Areas** | **Maintenance of visual quality to sustain Special Area management objectives is:** | |
| | Very important | High |
| | Moderately important | Moderate |
| | Slightly important | Low |

### 15.4 Key Observation Points (KOPs)

KOPs are defined by the BLM Visual Resource Management as the people located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations are used to assess the suitability of the proposed landscape modifications by means of assessing the degree of contrast of the proposed landscape modifications to the existing landscape, taking into consideration the visual management objectives defined for the area. The following selection criteria were utilised in defining the KOPs:

- Angle of observation;
- Number of viewers;
- Length of time the proposed project is in view;
- Relative proposed project size;
- Season of use;
- Critical viewpoints, e.g. views from communities, road crossings; and
- Distance from property.

### 15.5 VRM Classes

The landscape character of the proposed project site is surveyed to identify areas of common landuse and landscape character. These areas are then evaluated in terms of scenic quality (landscape significance) and receptor sensitivity to landscape change (of the site) in order to define the visual objective for the proposed project site. The overall objective is to maintain a landscape's integrity, but this can be achieved at varying levels, called VRM Classes, depending on various factors, including the visual absorption capacity of a site (i.e., how much of the proposed project would be “absorbed” or “disappear” into the landscape). The areas identified on site are categorised into these Classes by using a matrix from the BLM Visual Resource Management method as seen below, which is then represented in a visual sensitivity map

The BLM has defined four Classes that represent the relative value of the visual resources of an area:

iv. **Classes I and II**are the most valued
v. **Class III** represents a moderate value
vi. **Class IV**is of least value

| | | VISUAL SENSITIVITY LEVELS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | High | | | Medium | | | Low | | |
| **SCENIC QUALITY** | A (High) | II | II | II | II | II | II | II | II | II |
| | B (Medium) | II | III | III/ IV * | III | IV | IV | IV | IV | IV |
| | C (Low) | III | IV | IV | IV | IV | IV | IV | IV | IV |
| **DISTANCE ZONES** | | fore/middle ground | Background | seldom seen | fore/middle ground | background | seldom seen | fore/middle ground | background | seldom seen |

*(A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11)*

* If adjacent areas are **Class III** or lower, assign **Class III**, if higher, assign **Class IV**

Evaluation of the suitability of a proposed landscape modification is undertaken by means of assessing the proposed modification against a predefined management objective assigned to each class. The VRM class objectives are defined as follows:

1. The **Class I** objective is to preserve the existing character of the landscape, where the level of change to the characteristic landscape should be very low, and must not attract attention. **Class I** is assigned to those areas where a ***specialist decision*** has been made to maintain a natural landscape.
2. The **Class II** objective is to retain the existing character of the landscape and the level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer, and should repeat the basic elements of form, line, colour and texture found in the predominant natural features of the characteristic landscape.
3. The **Class III** objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
4. The **Class IV** objective is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the landscape can be high, and these management activities may dominate the view and be the major focus of the viewer's (s') attention.

### 15.6 Photo Montages and 3D Visualisation

As a component in this contrast rating process, visual representation, such as photo montages are vital in large-scale modifications, as this serves to inform I&APs and decision-making authorities of the nature and extent of the impact associated with the proposed project. There is an ethical obligation in this process, as visualisation can be misleading if not undertaken ethically. In terms of adhering to standards for ethical representation of landscape modifications, VRM Africa subscribes to the proposed Interim Code of Ethics for Landscape Visualisation developed by the Collaborative for Advanced Landscape Planning (CALP) (July 2003)*(Sheppard, S.R.J., 2005)*. This code states that professional presenters of realistic landscape visualisations are responsible for promoting full understanding of proposed landscape changes, providing an honest and neutral visual representation of the expected landscape, by seeking to avoid bias in responses and demonstrating the legitimacy of the visualisation process. Presenters of landscape visualisations should adhere to the principles of:

- Access to Information
- Accuracy
- Legitimacy
- Representativeness
- Visual Clarity
- Interest

The Code of Ethical Conduct states that the presenter should:

- Demonstrate an appropriate level of qualification and experience.
- Use visualisation tools and media that are appropriate to the purpose.
- Choose the appropriate level of realism.
- Identify, collect and document supporting visual data available for, or used in, the visualisation process.
- Conduct an on-site visual analysis to determine important issues and views.
- Seek community input on viewpoints and landscape issues to address in the visualisations.
- Provide the viewer with a reasonable choice of viewpoints, view directions, view angles, viewing conditions and timeframes appropriate to the area being visualised.
- Estimate and disclose the expected degree of uncertainty, indicating areas and possible visual consequences of the uncertainties.
- Use more than one appropriate presentation mode and means of access for the affected public.
- Present important non-visual information at the same time as the visual presentation, using a neutral delivery.
- Avoid the use, or the appearance of, 'sales' techniques or special effects.
- Avoid seeking a particular response from the audience.
- Provide information describing how the visualisation process was conducted and how key decisions were taken. *(Sheppard, S.R.J., 2005)*.

## 15.7 Contrast Rating Stage

The contrast rating, or impacts assessment phase, is undertaken after the inventory process has been completed and the proposed landscape modification is assessed from the Key Observation Point. The suitability of landscape modification is assessed by measuring the Degree of Contrast (DoC) of the proposed landscape modification to the existing contrast created by the existing landscape. This is done by evaluating the level of change to the existing landscape in terms of the line, colour, texture and form, in relation to the visual objectives defined for the area. The following criteria are utilised in defining the DoC:

- **None**::The element contrast is not visible or perceived.
- **Weak** :The element contrast can be seen but does not attract attention.
- **Moderate** :The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong** :The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

As an example, in a Class I area, the visual objective is to preserve the existing character of the landscape, and the resultant contrast to the existing landscape should not be notable to the casual observer and cannot attract attention. In a Class IV area example, the objective is to provide for management activities which require major modifications of the existing character of the landscape. Based on whether the VRM objectives are met, mitigations, if required, are defined to avoid, reduce or mitigate the proposed landscape modifications so that the visual impact does not detract from the surrounding landscape sense of place.

## 15.8 VRM Terminology

The following terms were used in the Contrast Rating Tables to help define Form, Line, Colour, and Texture. The definitions were a combination of Microsoft Word Dictionary and simple description

Table 21: VRM Terminology Table

| FORM | LINE | COLOUR | TEXTURE |
|---|---|---|---|
| Simple | Horizontal | | Smooth |
| Weak | Vertical | | Rough |
| Strong | Geometric | | Fine |
| Dominant | Angular | | Coarse |
| Flat | Acute | | Patchy |
| Rolling | Parallel | | Even |
| Undulating | Curved | Dark | Uneven |
| Complex | Wavy | Light | Complex |
| Plateau | Strong | Mottled | Simple |
| Ridge | Weak | | Stark |
| Valley | Crisp | | Clustered |
| Plain | Feathered | | Diffuse |
| Steep | Indistinct | | Dense |
| Shallow | Clean | | Scattered |
| Organic | Prominent | | Sporadic |
| Structured | Solid | | Consistent |

| | | | |
|---|---|---|---|
| **Simple** | Basic, composed of few elements | **Organic** | Derived from nature; occurring or developing gradually and naturally |
| **Complex** | Complicated; made up of many interrelated parts | **Structure** | Organised; planned and controlled; with definite shape, form, or pattern |
| **Weak** | Lacking strength of character | **Regular** | Repeatedly occurring in an ordered fashion |
| **Strong** | Bold, definite, having prominence | **Horizontal** | Parallel to the horizon |
| **Dominant** | Controlling, influencing the surrounding environment | **Vertical** | Perpendicular to the horizon; upright |
| **Flat** | Level and horizontal without any slope; even and smooth without any bumps or hollows | **Geometric** | Consisting of straight lines and simple shapes |
| **Rolling** | Progressive and consistent in form, usually rounded | **Angular** | Sharply defined; used to describe an object identified by angles |
| **Undulating** | Moving sinuously like waves; wavy in appearance | **Acute** | Less than 90°; used to describe a sharp angle |
| **Plateau** | Uniformly elevated flat to gently undulating land bounded on one or more sides by steep slopes | **Parallel** | Relating to or being lines, planes, or curved surfaces that are always the same distance apart and therefore never meet |
| **Ridge** | A narrow landform typical of a highpoint or apex; a long narrow hilltop or range of hills | **Curved** | Rounded or bending in shape |
| **Valley** | Low-lying area; a long low area of land, often with a river or stream running through it, that is surrounded by higher ground | **Wavy** | Repeatedly curving forming a series of smooth curves that go in one direction and then another |
| **Plain** | A flat expanse of land; fairly flat dry land, usually with few trees | **Feathered** | Layered; consisting of many fine parallel strands |
| **Steep** | Sloping sharply often to the extent of being almost vertical | **Indistinct** | Vague; lacking clarity or form |
| **Prominent** | Noticeable; distinguished, eminent, or well-known | **Patchy** | Irregular and inconsistent; |
| **Solid** | Unadulterated or unmixed; made of the same material throughout; uninterrupted | **Even** | Consistent and equal; lacking slope, roughness, and irregularity |
| **Broken** | Lacking continuity; having an uneven surface | **Uneven** | Inconsistent and unequal in measurement irregular |
| **Smooth** | Consistent in line and form; even textured | **Stark** | Bare and plain; lacking ornament or relieving features |
| **Rough** | Bumpy; knobbly; or uneven, coarse in texture | **Clustered** | Densely grouped |
| **Fine** | Intricate and refined in nature | **Diffuse** | Spread through; scattered over an area |
| **Coarse** | Harsh or rough to the touch; lacking detail | **Diffuse** | To make something less bright or intense |

# 16 Annexure 5: General Lights at Night Mitigations

Effective light management needs to be incorporated into the design of the lighting to ensure that the visual influence is limited to the mine, without jeopardising mine operational safety and security.

*Mitigation:*

- Effective light management needs to be incorporated into the design of the lighting to ensure that the visual influence is limited without jeopardising operational safety and security (See lighting mitigations by The New England Light Pollution Advisory Group (NELPAG) and Sky Publishing Corp in 14.2);
- Utilisation of specific frequency LED lighting with a green hue on perimeter security fencing.
- Directional lighting on the more exposed areas of operation, where point light source is an issue;
- No use of overhead lighting and, if possible, locate the light source closer to the operation; and
- If possible, the existing overhead lighting method should be phased out and replaced with an alternative lighting using closer to source, directed LED technology.

*Mesopic Lighting*

Mesopic vision is a combination of photopic vision and scotopic vision in low, but not quite dark, lighting situations. The traditional method of measuring light assumes photopic vision and is often a poor predictor of how a person sees at night. The light spectrum optimized for mesopic vision contains a relatively high amount of bluish light and is therefore effective for peripheral visual tasks at mesopic light levels*(CIE, 2012).*

The Mesopic Street Lighting Demonstration and Evaluation Report by the Lighting Research Centre (LRC) in New York found that the 'replacement of white light sources (induction and ceramic metal halide) were tuned to optimize human vision under low light levels while remaining in the white light spectrum. Therefore, outdoor electric light sources that are tuned to how humans see under mesopic lighting conditions can be used to reduce the luminance of the road surface while providing the same, or better, visibility. Light sources with shorter wavelengths, which produce a "cooler" (more blue and green) light, are needed to produce better mesopic vision. Based on this understanding, the LRC developed a means of predicting visual performance under low light conditions. This system is called the unified photometry system. Responses to surveys conducted on new installations revealed that area residents perceived higher levels of visibility, safety, security, brightness, and colour rendering with the new lighting systems than with the standard High-Purity Standards (HPS) systems. The new lighting systems used 30% to 50% less energy than the HPS systems. These positive results were achieved through tuning the light source to optimize mesopic vision. Using less wattage and photopic luminance also reduces the reflectance of the light off the road surface. Light reflectance is a major contributor to light pollution (sky glow).' *(Lighting Research Center. New York. 2008).*

## 16.1 'Good Neighbour – Outdoor Lighting'

Presented by the New England Light Pollution Advisory Group (NELPAG) http://cfa/ www.harvard .edu /cfa/ps/nelpag.html) and Sky & Telescope http://SkyandTelescope.com/). NELPAG and Sky & Telescope support theInternational Dark-Sky Association (IDA) (http://www.darksky.org/).

**What is good lighting?** Good outdoor lights improve visibility, safety, and a sense of security, while minimising energy use, operating costs, and ugly, dazzling glare.

**Why should we be concerned?** Many outdoor lights are poorly designed or improperly aimed. Such lights are costly, wasteful, and distractingly glary. They harm the night-time environment and neighbours' property values. Light directed uselessly above the horizon creates murky skyglow — the "lightpollution" that washes out our view of the stars.

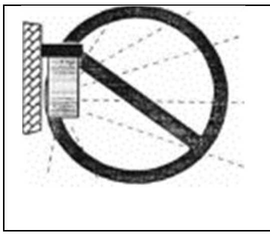
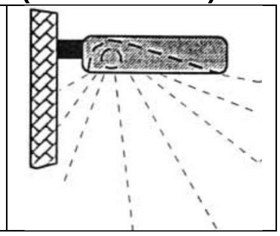
**Glare** Here's the basic rule of thumb: If you can see the bright bulb from a distance, it's a bad light. With a good light, you see lit ground instead of the dazzling bulb. "Glare" is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

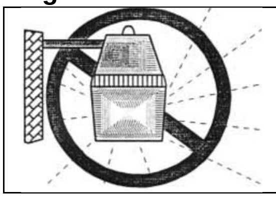
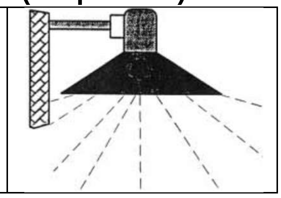
**Light Trespass** Poor outdoor lighting shines onto neighbours' properties and into bedroom windows, reducing privacy, hindering sleep, and giving the area an unattractive, trashy look.

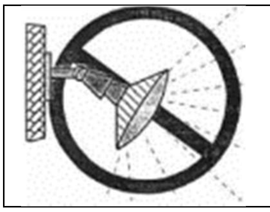
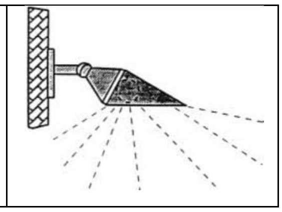
**Energy Waste** Many outdoor lights waste energy by spilling much of their light where it is not needed, such as up into the sky. This waste results in high operating costs. Each year we waste more than a billion dollars in the United States needlessly lighting the night sky.

**Excess Lighting** Some homes and businesses are flooded with much stronger light than is necessary for safety or security.

**Good and Bad Light Fixtures**

| **Typical "Wall Pack"** | **Typical "Shoe Box" (forward throw)** |
|---|---|
|  |  |
| **BAD**<br>Waste light goes up and sideways | **GOOD**<br>Directs all light down |

| **Typical "Yard Light"** | **Opaque Reflector (lamp inside)** |
|---|---|
|  |  |
| **BAD**<br>Waste light goes up and sideways | **GOOD**<br>Directs all light down |

| **Area Flood Light** | **Area Flood Light with Hood** |
|---|---|
|  |  |
| **BAD**<br>Waste light goes up and sideways | **GOOD**<br>Directs all light down |

**How do I switch to good lighting?**

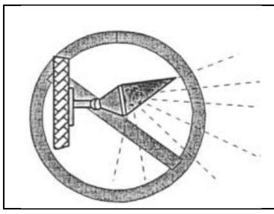
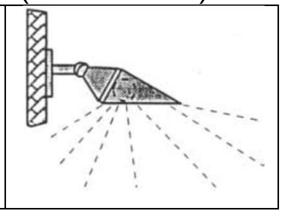
Provide only enough light for the task at hand; don't over-light, and don't spill light off your property. Specifying enough light for a job is sometimes hard to do on paper. Remember that a full Moon can make an area quite bright. Some lighting systems illuminate areas 100 times more brightly than the full Moon! More importantly, by choosing properly shielded lights, you can meet your needs without bothering neighbours or polluting the sky.

1. Aim lights down. Choose “full-cutoff shielded” fixtures that keep light from going uselessly up or sideways. Full-cutoff fixtures produce minimum glare. They create a pleasant-looking environment. They increase safety because you see illuminated people, cars, and terrain, not dazzling bulbs.

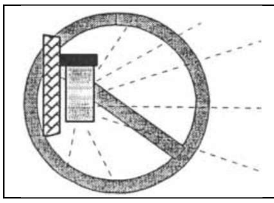
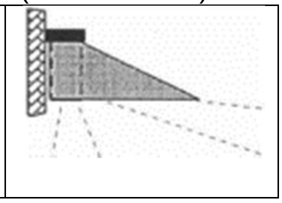
2. Install fixtures carefully to maximize their effectiveness on the targeted area and minimise their impact elsewhere. Proper aiming of fixtures is crucial. Most are aimed too high. Try to install them at night, when you can see where all the rays actually go. Properly aimed and shielded lights may cost more initially, but they save you far more in the long run. They can illuminate your target with a low-wattage bulb just as well as a wasteful light does with a high-wattage bulb.

**3.** If colour discrimination is not important, choose energy-efficient fixtures utilising yellowish high-pressure sodium (HPS) bulbs. If “white” light is needed, fixtures using compact fluorescent or metal-halide (MH) bulbs are more energy-efficient than those using incandescent, halogen, or mercury-vapour bulbs.

**What You Can Do To Modify Existing Fixtures**

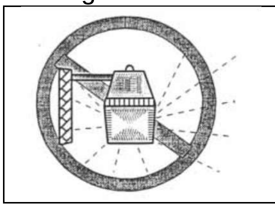
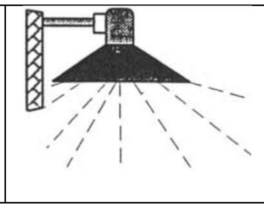
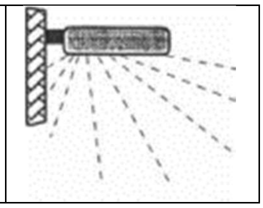
| Change this . . . | to this (aim downward) |
| --- | --- |
|  |  |

**Floodlight:**

| Change this . . . | to this (aim downward) |
| --- | --- |
|  |  |

4. Where feasible, put lights on timers to turn them off each night after they are no longer needed. Put home security lights on a motion-detector switch, which turns them on only when someone enters the area; this provides a great deterrent effect!

**Wall Pack**

| Change this . . . | to this | or this |
| --- | --- | --- |
|  |  |  |
| Yard Light | Opaque Reflecter | Show Box |

**Replace bad lights with good lights.**
You’ll save energy and money. You’ll be a good neighbour. And you’ll help preserve our view of the stars.